BOOK OF ABSTRACTS

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PREFACE

A Word from the Editor

Dear colleagues,

In your hands is the Book of Abstracts of the VIII International Scientific Agricultural Symposium "AGROSYM 2017", which I hope you will find useful in your work. As many as over 1300 contributions from 85 world countries have been accepted for oral or poster presentations regarding seven thematic areas: 1) Plant production, 2) Plant protection and food safety, 3) Organic agriculture, 4) Environment protection and natural resources management, 5) Animal Husbandry, 6) Rural development and agro-economy, and 7) Forestry and agroforestry

Sustainable development in agriculture, forestry and fisheries sectors should conserve land, water, genetic resources, and be environmentally non-degrading, economically viable, technically appropriate and socially acceptable. As the human population continues to increase, agro-food systems faces the challenge of fulfilling its vital function of feeding people, providing other basic agricultural commodities and generating stable incomes. Higher food demand, as a result of population growth and urbanization, as well as the lack of alternative job opportunities in rural areas is putting pressure on agriculture to increase production, resulting in degradation of the environment. Deforestation, erosion, desertification and biological diversity loss as well as various forms of pollution all threaten the ability of agricultural systems to even maintain their present level of production, let alone increase it.

Future needs for breeding and crop diversification cannot be predicted in the face of changing climates, new agricultural production systems, and unknown future human requirements. Conventional agricultural production allows achieving high yields but has negative impacts on the environment. Therefore, we must question how long our natural resources can meet the need for an increased output of agricultural commodities, before drastic degradation of the resource occurs and productivity falls even below its present levels.

AGROSYM 2017 will help of course to identify some measures by which we can decide on a course of action to make agriculture more sustainable from the environmental, economic and social point of view in the Balkans and beyond. The results reported in this Book of Abstracts will be also significant in the dissemination of knowledge to the wider audience about the importance of agriculture sciences, one of the most important strategic areas of many national research strategies.

Full texts of positively reviewed submitted contributions are available in electronic form (CD and web: http://agrosym.unssa.rs.ba). Each contribution included in this Book of Abstracts was reviewed by referees.

Many thanks to all the authors, reviewers, session moderators and colleagues for their help in editing the Book of Abstracts.

Special thanks go to all co-organizers, partners and sponsors for their unselfish collaboration and comprehensive support.

Editor in Chief

East Sarajevo, 25 September 2017

Prof. Dušan Kovačević, PhD

KEYNOTE PAPERS

ECOLOGICAL-ECONOMIC (ECO-ECO) MODELLING IN THE MOUNTAINOUS RIVER BASINS: IMPACT OF LAND COVER CHANGES ON SOIL EROSION

Velibor SPALEVIC[1], Dragan RADANOVIC[2], Goran SKATARIC[3], Paolo BILLI[4], Goran BAROVIC[1], Dusko VUJACIC[1], Paul SESTRAS[5], Abdulvahed KHALEDI DARVISHAN[6]

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Abstract

This research presents recently introduced approach by authors of the Ecological-Economic (Eco-Eco) modelling using the Intensity of Erosion and Outflow (IntErO) model for the assessment of soil erosion intensity and the impacts of different land covers on sediment yield. The Eco-Eco modelling approach has been applied in one of the sub-basins of the River Lim in the Northeast Montenegro: Bijeli Potok River Basin (2.9 km^2). Land use scenarios were simulated in the model with an aim to define the optimal scenario of agricultural production. The Ecological (Eco-) modeling shown that the real soil loss under current conditions is calculated on 307.16 m^3yr^{-1} (104.81 per km^2). If agricultural production is intensified, introducing the seed potato production on 4.4 ha of the studied river basin, the model calculated a soil loss of 312.96 m^3yr^{-1} as sediment yield (106.79 per km^2). The negative effects caused with the intensification of agricultural production were decreased with the measure of afforestation balancing with the identical surface of 3 ha (from meadows to forests). The model calculated that afforestation would result in a decrease of sediment yield to 306.46 m^3yr^{-1} (104.57 per km^2). The Economic (-Eco) modeling revealed that the investment (total cost) of €3,385 per hectare is needed for the establishment of the intensive agricultural – seed potato production. Market value of the final product is calculated to be €8,500 per hectare annually (yield of 17 tons per hectare); Profit €5,115; Net profit: €4,520. As an integral part of Eco-Eco modelling, we proposed the investment for the protection of the area (3 ha) with afforestation (implemented through the Government measures) that amounts to €3,844 (€1,281 per ha), for the period of two years, with no additional costs for the next decade (€128 per ha per year). Farmers should strive to get economic benefits, while respecting at the same time sustainable ecological and in this specific case: river basin - watershed management. The research results demonstrate that the application of the Eco-Eco modelling, by using the IntErO model for studying the effect of soil erosion and possible land use for intensive seed potato production in the selected River Basin provides cost effective solutions for the benefit of the local population.

Keywords: *Eco-Eco modelling, IntErO model, soil erosion, Bijeli Potok River basin, land cover.*

CURRENT PROBLEMS OF CARBON STORAGE IN AGRICULTURE AND FOREST ECOSYSTEMS - NEW FINDINGS

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Abstract

Carbon storage in the ecosystems is the result of permanent assimilatory activity of the plans. Carbon is allocated to the biomass and the soil. Because the nature of carbon storage, i.e. photosynthesis pumping of carbon dioxide from the atmosphere, the storage processes are strongly affected by the set of internal and external factors, respectively. Internal limitation is related to the gene transcription and translation, ontogeny of assimilatory organs, nutrient supply. Very important for open air growing plants are external factors manifested by he microclimate and changes of these parameters during the growing season. Current climate in the Europe is really changing. The increase of atmospheric CO_2 concentration up to 400 ppm is reality. The annual amount of precipitation is in principle not changing but what is significantly changing is the distribution of precipitation during the growing season. We are observing strong discrepancy between the phonological stages of the plants and availability of water in the soil. Thus, the soil water deficiency is regarded as the main manifestation of global changes in the Europe at present time. The changes in the potential carbon storage between different years starting to be really significant.

Key words: *Global change, carbon storage, microclimate effect, water availability.*

FOOD PROVISION IN THE 21st CENTURY: FROM CONTESTATION TO TRANSITION

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Abstract

Between 1945 and 1990, the focus of agricultural policies was on increasing food production through higher efficiency and further rationalization based on labour-saving technologies, feed conversion and conservation technologies. In many European countries, this widely shared orientation became increasingly disputed since the 1990s because food shortages disappeared, food risks attracted more public attention, public concerns regarding nature, climate, the environment and animal welfare increased, food provision became increasingly globalised, and cultural dimensions of food became more central lifestyle groups. Against this background different trajectories of change make up transitions in food consumption, retail and production. These multiple transition trajectories are investigated with respect to three dimensions of practices and institutions: the cultural (human-nature) dimension, the socio-technological dimension and the governance dimension.

Keywords: *Food, contestation, transition.*

1. PLANT PRODUCTION

EFFECT OF DIGESTIVE JUICE OF STURNUS VULGARIS ON THE GERMINATIVE POWER OF OLIVE CORES (NORTH-ALGERIA)

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Abstract

The starling is a migrant who comes to winter every year in Algeria. It is a species that is considered invasive species because it happens by millions in this part of northern Africa. Although it is responsible for much damage in olive groves, it was observed that it had the power to disseminate the olive cores. The aim of this study is to verify the effect of the digestive flora on the olive nuclei. This study area was chosen because it is a winnowing site for the European starling which allowed to collect nuclei of healthy olives under the oleaster and to gather at the same time nuclei in the droppings of the starlings Rejected under these trees. This experiment has been carried out in the botanical garden of the High National School of Agronomy at El Harrach in the eastern part of the Mitidja (Algeria). Thus 50 oleaster nuclei have been collected under the olive trees and 50 other whole nuclei have been found in the droppings of the starlings. The first lot concerned the nuclei collected under the olive trees after having undergone double chemical and physical scarification. The second batch was that of the nuclei rejected by the starling. The 100 nuclei have been placed under the same germination conditions. Then, observations were made regularly. The results showed that the kernels rejected by starlings were the first to germinate. Indeed, the first bud appeared two months after its placement in the pot. It was followed by other nuclei of the same batch whereas no germination was observed in the batch of scarified nuclei. It is clear that the digestive juice of the starling had a better effect on the olive cores than the chemical or mechanical scarification. These results confirmed the hypothesis concerning the ornithochory of the European starling.

Keywords*: European starling, oleaster, scarification, germinating power, ornitochory, Mitidja.*

PHYTOCHEMICAL PROFILE AND ANTIBACTERIAL ACTIVITY OF TWO MEDICINAL PLANTS (ROSEMARY (*ROSMARINUS OFFICINALIS* L.) AND LAUREL (*LAURUSNOBILIS* L.)) IN THE REGION OF TIARET (ALGERIA)

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Abstract

The objective of this research was to determine the phytochemical profile and antibacterial activity of two aromatic and medicinal plants; Rosemary (*Rosmarinus officinalis* L.) and Laurel (*Laurus nobilis* L.) in the region of Tiaret (Algeria). The yield of water and methanol extract of our samples was 19.65% and 33.73% for *Rosmarinus officinalis* L. and 18.7%, 29.96% for *Laurus nobilis* L respectively. The determination of total phenolic compounds in methanol extract of rosemary and laurel leaves using Folin Ciocalteu reagent gave an amount of 153.8 mg GAE/g, 87 mg GAE/g of extract respectively. Flavonoids content in rosemary and laurel was 109 µg QE/g extract and 35.5 µg QE/g extract respectively. Phytochemical screening results showed that the methanol extract of our plants was rich in flavonoids and tannins. The antioxidant activity of the methanol extract of our plants was measured by two methods: Free radical scavenging method (DPPH) which gave IC 50 values (IC 50= 0.04 mg/ml and 0.05 mg/ml) for rosemary and laurel respectively in comparison to the ability of DPPH radical scavenging of ascorbic acid whose IC 50 = 0.045 mg/ml, and Hemolysis method which showed an increase in absorbance during the 180 min incubation of the erythrocytes. The susceptibility tests of two bacteria; *Staphylococcus aureus* ATCC 25922 and *Escherichia coli* ATCC 10536 were carried out on solid medium. Both extracts exerted bacteriostatic activity on these two strains.

Keywords: *Rosemary (Rosmarinus officinalis L.); Laurel (Laurusnobilis L.), Phytochemical; antibacterial.*

COMPARATIVE STUDY OF YIELD AND CHEMICAL COMPOSITION OF *Lavandula stoechas* L. ESSENTIAL OILS HARVESTED FROM FOUR REGIONS OF ALGERIA

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Abstract

Lavandula genus is an important member of family *Labiatae* (*Lamiaceae*). *Lavandula* species are widely distributed in the Mediterranean region and cultivated in France, Spain and Italy. They are ornamental, melliferous and produces essential oil (EO) with an economic interest in the high perfume, pharmaceutical, food and flavor industries. In order to extend the qualitative and quantitative study of the essential oils of the species of *Lavandula stoechas* L. which spontaneously grows in northern Algeria, the harvest of flowering tips was carried out at maximum flowering stage (April) from four regions: Adekar (Béjaia), El-koudiate (Dellys), Keddara (Boudouaou) and El-kahla (Khemis el khechna) . The extraction of the essential oils of Adekar (AEO), El-koudiate (EEO), Keddara (KEO) and El-Kahla (HEO) was realized by the hydrodistillation method using a modified Clevenger-type system according to the European Pharmacopoeia. The yields of *Lavandula stoechas* EOs obtained are (1.17± 0.25%), (0.64± 0.04%), (0.62± 0.05%) and (0.50 ± 0.05%), respectively. 92.64%, 89.26%, 88.75% and 76%, respectively, of total compounds were identified by chromatography-mass spectrometry (GC / MS). The main compounds of AEO, EEO and KEO are: Fenchone, Camphor, Bornyl-acetate, Myrtenyl-acetate, 1,8 Cineole, Viridiflorol and Guaiol, with different percentages: (21.31%, 26.53%, 10.34%, 4.09%, 2.11%, 4.84% and 2.31%), (22.89%, 13.52%, 5.62%, 2.25%, 14.12%, 5.85% and 2.78%) and (23.90%, 9.57%, 3.43%, 2.70%, 16.48%, 5.32% and 2.54%), respectively. In HEO, Bornyl-acetate is replaced by *cis*-*α*-Copaene-8-ol (13.66%, 6.71%, 2.27%, 7.35%, 10.36%, 7.01% and 3.22%), respectively. The GC / MS analysis also showed a qualitative and quantitative difference concerning the secondary compounds of the four harvest sites.

Keywords: *Lavandula stoechas* L., *essential oil, yield, GC/MS, Algeria.*

PHYSIOLOGICAL TRAITS OF WHEAT GENOTYPES UNDER DROUGHT STRESS

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Abstract

Wheat is an important cereal crop in global food supply. Drought is a main constraint in productivity of wheat across the rainfed regions of the world, including Azerbaijan. Different physiological traits have been proposed as key traits assosiated with yield potential as well as performance under water stress. We aimed to study the impact of soil water deficit on gas exchange parameters, relative water content and pigments content of flag leaf, assimilation area and dry matter dynamics of leaves per stem, stem and spike from booting to grain milky ripe, pre-anthesis dry matter remobilization from vegetative parts into grain and grain yield of 8 durum wheat and 14 bread wheat genotypes grown in irrigated and non-irrigated field conditions. Water deficiency caused reduction of stomatal conductance, photosynthesis and transpiration rates, and an increase of intercellular CO_2 concentration. The genotypic differences in the relative water content of flag leaf was revealed at kernels milky ripe. High relative water content in the flag leaf under drought stress was detected in genotypes Vugar, Sharg, Gyrmyzy bugda, Dagdash, which indicates the drought resistance of these genotypes. Drought led reduction of Chl a, b, Car(x+c) contents, Chl(a+b)/Car(x+c) ratio. An increase of aboveground dry mass continued to grain milky ripe. Drought stress accelerated pre-anthesis dry matter translocation from vegetative plant parts into grain. Dry matter remobilization was higher in durum wheat genotypes Barakatli 95, Tartar, in bread wheat genotypes Akinchi 84, Giymatli 2/17, Pirshahin 1 and Gunashli. Dry mass remobilization efficiency was lowest in the tallest genotypes Sharg, Gyrmyzy bugda and Dagdash under both irrigated and rain-fed conditions. The minimum yield loss from drought was revealed in durum wheat genotype Gyrmyzy bugda and in early heading bread wheat genotypes Nurlu 99, Gobustan and Gunashli. We conclude that an advantages of some genotypes- early heading allows more dry matter remobilization into grain and also drought escape.

Keywords: *Drought, gas exchange, chlorophyll, relative water content, wheat.*

APPLICATION OF INTEGRATED VOLAT-24 PREPARATION AT HORTICULTURE OF STRAWBERRY AND AUTUMN RASPBERRY

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Abstract

Strawberry and raspberry are becoming high-tech crops, as the main emphasis is put on obtaining high and stable yields through the use of complex water-soluble fertilizers. In Belarus, plantations of strawberry garden occupy an area of 9000 ha, as to raspberry plantations, expansion of commodity plantations up to 400 ha is envisaged. The use of high-quality fertilizers with high purity and balanced composition, the selection of fertilizers on the basis of plant and soil diagnostics in specific soil and climatic conditions of the farm makes it possible to achieve high yields and quality of products that ensure profitability of berry production. Preparation Volat-24 of the Belarusian production contains a balanced water-soluble complex of trace elements in the form of copper, zinc, iron, molybdenum, cobalt, manganese chelates of high bioavailability for berry plants. The components of productivity and yield were studied in the regionalized varieties of strawberry 'Kimberly' and raspberry 'Babie leto'. As a result of the conducted studies, it was found that the use of the preparation Volat-24 promoted an increase in the number of both peduncles and number of berries in comparison with the control (75% and 65.4%, respectively). Yields of strawberry at the same time amounted to 13.7 t/ha, which exceeded the control by 60%. Using Volat-24 increased the number of laterals - 7.6% and berries on the lateral - 94% and productivity (13.3 t/ha) - 17.7% compared to the control variant.

Keywords: *Strawberry, non-root fertilizer, autumn raspberry, Belarus.*

DIFFERENTIAL GROWTH RESPONSE OF THE MIRACLE PLANT *SYNSEPALUM DULCIFICUM (SCHUMACH & THONN.) DANIELL* TO MINERAL FERTILIZATION INDUCED BY SEEDLING AGE

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Abstract

While the beneficial effect of fertilization in woody species is still under debate, the fertilization timing is also to be considered for an effective seedling growth management. In the case of *Synsepalum dulcificum*, a promising African plant resource and the only natural source of "miraculin" (aglycoprotein with sweetening activity), information regarding fertilization management is lacking. This study evaluated the contribution of fertilization timing and mineral nutrient supply to the species growth and aims at accelerating the transition to reproductive phase the species. We evaluated the effect of single nutrient (nitrogen, phosphorus, potassium) and combined nutrients (nitrogen+phosphorus+potassium) supply at the dose at 4.5 g eachon diameter and height growth, leaves production, specific leaf area and time to fruiting of two age classes (5 and 15 months) seedlings. Nitrogen application at the dose of 4.5 g per seedling was detrimental and reduced survival down to 0% whatever the seedling age. The interaction among the age class and the nutrient type affected all growth parameters except the specific leaf area. The application of the combined nutrients (nitrogen, phosphorus, potassium) exhibits the most prominent effect of the species growth whereas 15 months old juveniles represent the best age for initiating mineral fertilization in the species. To induce early flowering and fruiting phenotypes in *S. dulcificum* we recommend the application of the combination of nitrogen, phosphorus, and potassium at the dose of 1.5 g each to 15 months old juveniles. These findings are new regarding the species horticultural development.

Keywords: *Magic berry, inorganic fertilization, vegetative growth, early fruiting.*

THE EFFECT OF VEGETABLE FATS ON THE QUALITY AND SENSORY PROPERTIES OF TEA COOKIE

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Abstract

One of the basic raw materials in the production of vanilla crescents are vegetable fats, which affect the product taste, consistency, texture and other properties. The purpose of this paper is to examine the effect of application of the different types and quantities of vegetable fats on the quality of vanilla crescents produced at the *Klas Sarajevo* Company plant. The vegetable fats used in this paper were products of companies *Zvijezda* and *Dijamant*. In the course of production, fats were added in accordance with the original recipes, ± 5 % more or less quantity compared to the original recipe. Directly after the production and two months after the preservation, all the samples of vanilla crescents were subjected to sensory evaluation in order to examine the extent to which the change in the type and quantity of vegetable fats affected the quality parameters of the basic product, specifically, the product shape, upper and lower surface, breakage, structure and crispiness, solubility, and smell and taste of vanilla crescents. The evaluated quality parameters were rated from 1 to 5, multiplied by a corresponding significance coefficient (SC), specifically 0.3 for shape, 0.5 for upper surface, 0.4 for lower surface and breakage, 0.6 for structure, and 1 point for taste and smell. The values thus obtained were then added up, the maximum sum of points being 20. The data obtained in the research were analyzed by applying the standard statistical analysis of variance (ANOVA) and Tukey's test ($W_{0,05}$ test), using Microsoft Excel 2003. Based on the statistical analysis of data, the research results were interpreted and conclusions were drawn.

Key words: *Vegetable fats, vanilla crescents, melting point, fat, sensory evaluation.*

VARIATION IN MORPHOLOGICAL TRAITS OF RED CLOVER (*Trifolium pratense* L.) IN BANJA LUKA (BOSNIA AND HERZEGOVINA) ENVIRONMENTAL CONDITIONS

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Abstract

The agronomic properties of red clover (*Trifolium pratense* L.) depend on a series of morphological and physiological traits which are influenced by genetic and environmental factors. The purpose of our research was to study the variability of the morphological traits of four advanced lines (DS-1, DS-2, DS-3 i DS-4) and four red clover cultivars (Nike, Viola, Kolubara and Start). The experiment was carried out at the location Manjača close to Banja Luka city during 2010 and 2011 growing seasons. The soil type was a pseudoglay with acid reaction (pH 5.1). Data were collected from the first growth in 2010 and the first and second growth in 2011. The highest content of leaves and flowers in the hay was found in the cultivar Viola (50%), and the lowest one in the cultivar Start (43%). The largest number of stems per plant, the longest and the widest leaflet (blade) and the lowest content of leaves and flowers in the hay across genotypes were determined in the first growth of the second year. The second growth of the second year was characterized with the lowest plant, the smallest number of stems per plant, the thinnest stem, the shortest leaflet and the highest content of leaves and flowers in the hay. The first growth of the first year showed the thickest stem and narrowest leaflet. The number of stems per plant had the highest variation, while the length of leaflet was the most stabile trait. In the breeding programme of the red clover, the cultivar Kolubara can be used as a donor of genes for the larger number of stems per plant. The cultivar Nike can be used for resistance to lodging and the cultivar Viola can be used for higher content of leaves and flowers in the hay.

Keywords: *Red clover (Trifolium pratense L.), morphological traits, variability.*

YIELD STABILITY OF DIFFERENT MATURITY GROUPS OF MAIZE IN THE VARIABLE AGROECOLOGICAL CONDITIONS

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Abstract

During the period 2012-2016 in Kosijerovo near city of Banja Luka (Entity of Republic of Srpska, Bosnia and Herzegovina), a scientific research team of the Agricultural Institute of Republic of Srpska, Banja Luka, has performed macroexperiments with the maize hybrids from 300-600 maturity groups (FAO). The experiment was performed on the same site with the use of identical agrotechnical measures, in a random block design with five replications. By calculating an average value of the standard deviation and variation coefficient, the results of adaptability of hybrids to variable climatic conditions and their stability in grainyield were obtained. Thus, in the five-year average the hybrids FAO 400 achieved the highest yield (10.503 kg ha^{-1}), and the lowest was in the FAO 300 (9.994,6 kg ha^{-1}). The lowest yield was achieved in the drought year 2012 (8.408,8 kg ha^{-1}), and the highest in 2016 (12.084 $kgha^{-1}$). The greatest difference between an average yield in the three drought year and extremely humid year 2014 was registered in the FAO maturity group 500 (4.522,7 $kgha^{-1}$), and the lowest 1.172,8 $kgha^{-1}$ for FAO 300. Based on the results of variation coefficient the lowest yield variation in the five-year period for FAO 300 was determined (10.58%), and the highest in FAO 500 (21.55%). For all maturity groups the lowest average variation in maize yield was recorded in humid years (Cv 7,16%), which is almost twice as low as in the dry years (13,16%). It can be concluded that the different maturity groups, on average during the period of 2012-2016, were stable or relatively stable in the achievement of maize grain yield.

Keywords: *maize, yield, FAO, variation, stability.*

GENETIC AND ENVIRONMENTAL VARIABILITY OF YIELD AND YIELD COMPONENTS IN THE SOYBEAN (*Glycina max* L.)

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Abstract

The soybean is a crop of global importance and one of the most frequently cultivated crops worldwide. Despite having favorable conditions for soybean production, Bosnia and Herzegovina meets almost all demand for the soybean with imports. The aim of this study was to determine variability of yield and yield components of seven commercially most widespread varieties of soybean (Valjevka, Galina, Dukat, Biser, Galeb, Sonja and Milica) in agro-ecological conditions of the locality of Banja Luka in the period 2015-2016. The number of pods per plant ranged from 28, produced by the variety Galina, to 32, produced by the variety Sonja. Across the varieties, the number of pods was larger in 2015 than in 2016. Approximately the same part of the variance for the number of pods per plant belonged to the variety, year and variety x year interaction. This component of yield varied largely due to the influence of the year (44.1%), whilen the influences of the variety and variety x year interaction were approximately the same (25%). 1000-seeds weight was lowest in the variety Valjevka (157 g), and the highest in the variety Sonja (171 g). Approximately 20% of the variance of 1000-seeds weight belonged to the varieties, 60% to the year and 17% to the interaction. The lowest yield was recorded in the variety Milica (3.13 t/ha), and the highest in the variety Galeb (3.84 t/ha). The harvest index varied from 0.31 to 0.43. The number of seeds per pod was positively correlated with pot weight and above ground biomass, and seed yield with number of pods per plant and above ground biomass. The genetic variability of the registered soybean cultivars in relation to the length of the growing season, and requests to the ecological conditions allows the selection of the most suitable cultivar for all growing regions.

Keywords: *Soybean (Glycina max L.),variety, yield components, yield, harvest index.*

MAIZE RESPONSE TO LIMING AND PHOSPHORUS FERTILIZATION IN LIJEVCE POLJE REGION OF BOSNIA AND HERZEGOVINA

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Abstract

The field experiment of liming (0 and 10 t ha^{-1} of powdered hydrated lime) and phosphorus (P) fertilization (monoammonium phosphate or MAP: 12% N + 52% P_2O_5) started in autumn 2008 on acid soil (pH in 1n KCl: 4.28) of Lijevce polje region (Laktasi municipality, Bosnia and Herzegovina). Three doses of P (0, 500, 1000 and 1500 kg P_2O_5 ha^{-1}) on the conventional fertilization (160 N + 75 P_2O_5 + 75 K_2O kg ha^{-1}) were applied in four replicates (basic plots of liming and P fertilization 640 m^2 and 40 m^2, respectively). The conventional fertilization was applied in the next years of the experiment. Soil of the experiment was low supplied with plant available P and adequate supplied with potassium (AL-method: 2.9 mg P_2O_5 and 23.4 mg K_2O in 100 g of soil). Maize was grown in monoculture from 2009 to 2013. Average grain yield of maize was considerable different among the years, ranging from 2.06 to 9.38 t ha^{-1}. Under less favorable weather conditions (drought and high temperature stress) in the 2011, 2012 and 2013, yields were considerably lower (mean 4.28 t ha^{-1}) than in the remaining two years (mean 9.20 t ha^{-1}). In general, liming effects on maize yields were stronger than P effects with considerable impacts of weather conditions. Affected by liming, yields were increased for 39%, 18%, 47%, 25% and 158%, for 2009, 2010, 2011, 2012 and 2013, respectively. However, P effects ranged, depending on the year, from non-significant differences (2012) to 32% (2013).

Keywords: *Maize, liming, fertilization, phosphorus, grain yield.*

THE EFFECT OF LIME MATERIALS AND ZEOLITE APPLICATION ON ALFALFA (*MEDICAGO SATIVA* L.) PRODUCTION AND QUALITY ON ACID SOILS

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Abstract

Large areas of acid soils in the entity of Republic of Srpska (Bosnia and Herzegovina) are one of the limiting factors for stable and successful agricultural production. These soils have low productivity and undesirable chemical, physical, and biological properties, therefore an improvement of these properties by application of different revitalizsation measures is of a crucial importance. Though alfalfa (*Medicago sativa* L.) is one of the most important perennial feed legumes, which is sensitive to a soil low pH value. The effect of lime materials and zeolite application on the production and quality of alfalfa was investigated in the agro-ecological conditions of Banja Luka region at the Petrićevac locality, in the period 2015-2016. The pH soil at this locality was 5.13 and the average humus content was 3.7%. Four treatments were applied: control, limestone, zeolite and limestone + zeolite. Alfalfa was sown at approximately 20 kgha^{-1}. At the first harvest in 2015, the combination of lime material and zeolite had no effect on the production and quality of alfalfa hay. In 2016, in comparison to control, this combination significantly affected the production of green forage and hay for all three harvesting periods. Also, the highest total hay yield of 16.10 t ha^{-1} was achieved in 2016 for this combination. The content of crude proteins ranged from 16.54% to 17.74% in the first year and from 19.61% to 20.34% in the second year, with no differences in comparison to control. Based on the obtained results in the two-year experiment, it can be concluded that the combination of lime material and zeolite can increase the production of alfalfa green forage and hay, with no effect on the content of crude proteins.

Key words: *Medicago sativa L., limestone, zeolite, yield, crude protein.*

PRODUCTIVITY AND QUALITY OF THE SPRING FIELD PEA (*PISUM SATIVUM* L.) IN DIFFERENT AGROECOLOGICAL CONDITIONS

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Abstract

Field peas (*Pisum sativum* L.) is one of the cheapest, the best and the most worth legumes for the production of forage on arable land in different environmental conditions. The research goal was to determine productive characteristics and grain quality of five field peas spring varieties at two locations (Banja Luka and Manjača) in 2015 and 2016. Afila leaf type varieties (Baccara and Javor) had a stem height below 50 cm and varieties of normal leaf type (Junior, Crveni cvijet, Saša) had above 100 cm. Across varieties the highest yield of hay (3.76 t/ha) was at the Manjača location in 2015, and the lowest (1.94 t/ha) at the Banja Luka location in 2015. Across environments the highest yield of grain (3.38 t/ha) had the variety Javor, and the smallest the variety Saša (2.23 t/ha). Across environments the highest TKW (thousand kernel weight) had the variety Baccara– 216 g, and the least had the variety Junior – 155 g. The content of crude protein in grain was 26-31%, crude cellulose 5.7-6.4% and ash 3.55-3.64% dm. In all traits the smallest part of variance belonged to the interaction variety x environment.Yield variation of hay, contents of protein, cellulose and ash was under the control of variety (about 40%) and the environment (about 40%). Yield of hay was in positive correlation with the density, the number of pods per plant, TKW and with cellulose content. Contents of proteins in grain was in positive correlation with plant height and the height of the first pods, but in negative correlation with the density, yield of the hay and TKW. For the production of the livestock food in mountain areas should use varieties that have a balanced relationship between the yield of the overground mass and the quality.

Keywords: *Field peas (Pisum sativum L.), yield, variety, quality*.

PHENOLOGICAL AND POMOLOGICAL ANALYSIS OF FRUIT AUTOCHTONOUS VARIETY OF SWEET CHERRY „ALICE „ IN MOSTAR AREA BOSNIA AND HERZEGOVINA

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Abstract

The paper presents the results of a two-year study of flowering dynamics and fruit morphological characteristics of autochtonous sweet cherry (*Prunus avium* L.) variety „Alice“ within the period 2013-2014 in the area of Mostar in Bosnia and Herzegovina. The study included monitoring of phenological characteristics such as bloom phases, fruit setting and maturation, and morphological characteristics such as weight, length, width and thickness of the fruit, stone weight, stem length and randman. Results showed earlier vegetation on set, so phenophases lasted longer in 2014, which can be directly related to more favorable climatic conditions in that year. The bloom phase in 2014 lasted longer (11 days), due to the high precipitation period which caused prolonged blossom in comparison to shorter bloom phenophase in 2013, that lasted 7 days only. Shorter period of fruit development (34 days) was recorded in 2013, comparing to the period of fruit development in 2014 (42 days). The most of morphological characteristics such as average fruit weight, stone weight and fruit skin weight showed statistically significant differences depending on the year, so their values were higher in 2013, copmaring to 2014. Higher values of fruit width, thickness and length of the fruit stalk were recorded in 2013 as well, while randman of fruits showed no significant variations in relation to the year. Based on the research results, it may be concluded that this, once very respectable variety, over the years has acquired adaptability to climate conditions and that it should be further on investigated as a valuable genetic potential.

Keywords: *Phenological and pomological characteristics, autochtonous, seert cherry, Alica.*

MORPHOLOGICAL AND PRODUCTIVE CHARACTERISTICS OF Bc MAIZE HYBRIDS (*Zea mays* L.)

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Abstract

Maize (*Zea mays* L.) is the most important crop in Bosnia and Herzegovina, being grown on around 200,000 ha, with anaverage yield of only 4.2 t/ha. In order to increase the grain yield, it is necessary to use a new generation of hybrids in the production that have improved grain yield and quality. The aim of this study was to evaluate the agronomic properties of new Bc maize hybrids in the agroecological conditions of the municipalities of Srbac, Prnjavor and Modriča. In this research, five Bc maize hybrids were analyzed (Bc306, Bc344, Bc424, Bc418b and Bc574) from FAO 300 to FAO 500 in growing season 2016. Plant height ranged from 227 cm at Bc344 to 242 cm at hybrid Bc418b. The highest yield across locations have been found in hybrid Bc306 (12.52 t/ha). Yield was positively correlated with the stand (0.324 **), above ground biomass (0.864 **), number of grains per cob (0.655 **) and grain yield per cob (0.531 **). The highest thousand kernel weight was achieved by hybrid Bc418b (379 g) and the lowest by hybrid Bc574 (348 g). The maximum number of rows per cob had Bc424 hybrid (15.7), while most grains per cob was found in hybrid Bc574 (643.5). Hybrid Bc306 had the highest test weight (77.83 kg/hl), while the lowest was at Bc424 hybrid (74.82 kg / hl). In all traits in the total variance the portion of hybrid and location were significant ($p<0.01$) and contribution of interactions was insignificant. Bc maize hybrids in given ecological conditions are achieving high yield and have good grain properties and can be recommended for the large-scale production.

Keywords: *Maize (Zeamays L.), yield components, yield, components of variance, correlation.*

IMPACT OF HERBICIDE ADENGO ON MICROBIAL DIVERSITY OF SOIL UNDER CORN

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Abstract

In modern plant production usage of pesticides is necessary in order to obtain good quality of yield. In corn production, Adengo is one of the most used systemic herbicides for control of grasses and broadleaf weeds. Usage of inadequate concentrations of herbicides may have negative consequences for microbial diversity. The aim of this paper was determination of Adengo influence on microbial diversity in soil under corn. Experiment was performed in Ilidža municipality (Sarajevo canton, Bosnia and Herzegovina) by sowing seeds in spring 2016, followed by Adengo application in three various concentrations (0.22; 0.44; and 0.88 l/ha). Control treatment was untreated soil. Sampling for microbiological analyses was performed 15. 30. and 130 days after sowing. Microbial diversity of soil was determined using standard agar plate method. Total number of bacteria was determined on 0.1xTSA, ammonification bacteria on nutrient agar, nitrogen fixation bacteria and *Azotobacter* sp. on Fyodorov agar, fungi on Rose Bengal streptomycin agar, and actinomycetes on starch-ammonia agar. Microbial activity of soil was expressed as colony forming units per g of dry soil. The highest total bacterial number was detected at the end of experiment. Similar results were obtained for *Azotobacter* sp. and nitrogen fixation bacteria and fungi while highest abundance of ammonification bacteria was obtained in the start of experiment. Number of actinomycetes was highest after 330 days from sowing. These results may be useful for further application of herbicide Adengo in corn production, as well as other crops planting.

Key words: *Herbicide, microbial diversity, corn, Adengo.*

MICROBIOLOGICAL PROPERTIES OF SOIL UNDER CORN AFTER APPLICATION OF HERBICIDE LUMAX

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Abstract

In contemporary crop production, several techniques were developed for protection from weeds. One of methods is herbicides application. Herbicide Lumax (Syngenta) can be used for control of annual grasses and broadleaf weeds in corn and sorghum. The usage of herbicide may influence the microbiological properties of soil, which is important parameter of soil fertility. The aim of this paper was determination of influence of herbicide Lumax on microbiological properties of soil. Experiment was set up in May 2016 in Ilidža municipality (Bosnia and Herzegovina) by sowing corn seeds and application of herbicide Lumax in three concentrations (2, 4, and 8 l/ha). Soil sampling for microbiological analyses was performed 15, 30, and 130 days after sowing. Determination of microbiological properties of soil was performed using standard methodology and agar plate method. Microbial activity was expressed as colony forming units per g of absolutely dry soil. Highest total number of bacteria and *Azotobacter* sp. was noticed at the end of experiment, while ammonification and nitrogen fixation bacteria in most of samples were most abundant 15 days after sowing. Fungi were most abundant in the start of experiment, while actinomycetes number was highest 30 days after sowing seeds. These results showed good adaptation of total bacteria and *Azotobacter* sp. in the presence of Lumax, while number of fungi, ammonification and nitrogen fixation bacteria in most of samples decreased during the growth of corn. This research may be useful for further experimental designs considering the impact of herbicides on microbial diversity in corn production.

Key words: *Microorganisms, soil, corn, herbicide, Lumax.*

WEATHER CONDITIONS IN BOSNIA AND HERZEGOVINA FROM 2011 TO 2015 PERIOD WITH ASPECT OF MAIZE GROWTH AND CLIMATIC CHANGE

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Abstract

Maize is main field crop on the arable lands of Bosnia and Herzegovina (B&H). In the 2011-2015 period, maize was grown on average 189 137 ha or close to 20% of arable land. The majority of maize growing area was situated in the northern lowland region and in Republic of Srpska (RS). Considerable variation of the yearly yield was found in this period from 2.7 t ha^{-1} (2012) to 4.7 t ha^{-1} (2014), mainly under influence of weather conditions. With that regard, precipitation and temperature regimes, particularly in July and August, had considerable effects. 2011, 2013 and 2015 growing seasons were more close to usual values. However, 2012 and 2014 were considerably deviated and characterized by drought and hot stress (2012) and excessive, but for maize more favorable, precipitation and the lower temperature (2014). Six meteorological stations were selected for weather characterization as follows: Bijeljina (BI), Tuzla (TZ), Gradacac (GR), Banjaluka (BL), Prijedor (PR) and Bihac (BH). Precipitation and mean air temperatures in the period 2011-2015 were compared to the long-termmeans1961-1990 (LTM). In general, precipitation in the April-September period (LTM) was lower and temperatures higher in the eastern part (BI: 417 mm and 17.8 ^{o}C) than in western part (BI: 664 mm and 16.6 ^{o}C) of the country. These values for two deviated growing seasons were as follows: 288 mm and 20.0 ^{o}C in BI, 693 mm and 18.9 ^{o}C in BH (2012), 731 mm and 18.5 ^{o}C in BI, 1135 mm and 17.1 ^{o}C in BH (2014).

Keywords: *Precipitation, temperature, maize yield, climatic change.*

INHERITANCE OF PRODUCTIVITY IN F1 COTTON DIALLEL CROSSES (GOSSYPIUM HIRSUTUM L.)

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Abstract

The studies on the genetic control of productivity are of great importance for the breeding of new productive cotton varieties. In 2010-2011 to investigate the inheritance of productivity, six varieties (*G. hirsutum* L.), differing in productivity were included in a half diallel cross. In 2012-2013 another half diallel cross including other six parents was made, too. The study was carried out in the experimental field of the Field Crops Institute in Chirpan. F_1 hybrids of straight crosses and their parental forms were studied. The components of variability caused by the additive and dominant effects and their ratios, the variability due to the conditions of the environment were determined. Based on these, the indexes of inheritance of productivity were calculated. It was found that the productivity in the studied sets of crosses was controlled by additive-dominant genetic system with a transcendence of dominant effects. Complementary epistasis exhibition depending on ecological environment (years) was also possible. Statistically significant were both additive and dominant effects. Dominant gene action was superior to additive one for both diallel crosses and reflects the great importance of dominant variance in the inheritance of productivity. The parents had different dominance (recessiveness) in the different years of the exploration probably due to changeability of gene spectrum specifying the productivity under the influence of year conditions. Because of high degree of dominance, weakly genetic variability and different expression of genes depending on environmental conditions, quick and successful selection can not be expected.

Key words: *Cotton, G. hirsutum L., diallel analysis, productivity.*

ASSESSING THE INFLUENCE OF LEAF NUTRITION ON COMMON WHEAT VARIETIES THROUGH THE DUNCAN TEST

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Abstract

The purpose of the study was to estimate the dependence between basic biometric parameters for two common wheat varieties using a one-factor dispersion analysis. The study was conducted in the field of study of the Department of Plant Growing, Faculty of Agriculture at the Trakia University, Stara Zagora (Bulgaria) in the period 2014-2016 in the conditions of meadow-cinnamon soil. The effect of the additional nutrition of the crops with Lactifrost and Lactofol base was found, which contributed to an increase in the yield of Enola by 5.7% and 22.2%. With Illico there is an increase of about 10.0 and 13.3%. Experimental data are estimated by the average values $\bar{x}$ for each variety and indicator, the mean error $S\bar{x}$, the standard deviation s and the coefficient of variation CV, %. Through the Duncan test for multidirectional comparison, a variation is made. Both wheat varieties have the lowest variation coefficients at plant height. A statistically significant influence of the "variety" factor on the "Class length" biometric indicator was established with a high degree of reliability and for the three years under review for the two wheat varieties.According to the two-factor dispersion analysis, both the influence of both factors (variety and treatment options) separately, as well as their interaction, the influence on the indicators: "plant height" and "number of grains" is not statistically proven. The interaction of the two factors is statistically unproven, with the exception of the "class length" indicator for 2016, the "number of clusters" for 2014. And "plant height" for 2016.

Key words: *Common wheat, biometric indicators, Duncan test, ANOVA.*

THE POTENTIAL OF GRASS HAY ON MILK PRODUCTION OF DAIRY COWS

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Abstract

Profitability of milk production depends on quantity, quality and price of voluminous feed. Cost of feed represents about 50% of the total price of milk. Therefore, it is important to have information about adaptability and stability species that are intended to be used in the production of forage in an area, in order to increase food production and significantly reduce its share in the cost of milk. The aim of this study was to compare and determine the productive potential of several grass species in semi-humid region of Southeast Europe. The study used five species of grass with a few materials per species. The yield and quality of hay were analyzed through two years of production. The study showed no statistically significant differences between varieties within species. Significant differences were found between species for yield and other investigated traits. Italian ryegrass varieties were achieved the highest yield of hay, while the largest proportion of crude protein has been realized with cocksfoot grass species. All kinds of ryegrass had higher relative feed quality in relation to the species of grasses. The realized values of yield and quality of all the analyzed grass species were considerably lower than expected. The orchard grass species had the highest protein yield what enables the production of 12264 kg milk per ha. The highest net energetically production (NEl) had ryegrasses with a potential of 21265 kg of milk /ha.

Keywords: *Grass species, hay, quality, milk production.*

WATER USE EFFICIENCY AND LAND EQUIVALENT RATIO OF SOYBEAN AND CORN IN SOLID AND INTERCROPPING SYSTEMS IN EGYPT

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Abstract

The present investigation was carried out at Giza Agricultural Experiments and Research Station, Faculty of Agriculture, Cairo University, (Egypt) during the two successive seasons 2015 and 2016 to determine yield, water use efficiency (WUE), land equivalent ratio (LER) of intercropping soybean with corn in beds as compared with solid plantings in traditional ridges. The experiment included eighteen treatments which were the combinations between three applied irrigation water (75, 100 and 125% of the recommended water applied) and six cropping systems (50% soybean + 100% corn, 100% soybean + 100% corn, traditional solid corn, solid corn 'mixed system', traditional solid soybean and solid soybean 'mixed system'). The experimental design was split plot design with four replications. The data indicated that soybean seed yields per plant and per ha were affected negatively by intercropping with corn. Increasing soybean plant density per unit area from 50 to 100% of soybean solid culture achieved high seed yield without any significant reduction on corn grain yield. Each of applied irrigation water and the interaction between applied irrigation water and cropping systems did not affect soybean seed yield; meanwhile the reverse was true for corn crop. LER was not affected by applied irrigation water but there were significant effects for cropping systems and the interaction between applied irrigation water and cropping systems. LER ranged from 1.39 to 1.52. WUE was increased with decreasing applied irrigation water from 125 to 75% of recommended applied irrigation water. High population densities of the intercrops with application 100% of applied irrigation water achieved the highest LER and WUE and could be recommended for Egyptian farmers.

Keywords: *Intercropping, Soybean, Corn, WUE, LER.*

DEVELOPMENT OF RELATIVE YIELDS WITH OMITTED PHOSPHORUS FERTILIZATION

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Abstract

Phosphorus fertilizer recommendations in most European countries are based on plant available soil P contents which are assessed using various extraction procedures. The interpretation of these soil P contents in terms of soil fertility classes is based on the yield increase which has been observed in long-term field experiments. This traditional scheme has resulted in excessive P fertilizer recommendations in the past decades, causing widespread diffuse P losses and eutrophication problems, and excessive exploitation of geological P resources. Moreover, in this approach site and soil specific conditions are accounted for only inadequately. Based on a meta-analysis of 30 long-term fertilizer experiments throughout Germany and Austria we analyze the effect of omitted P-fertilization on relative yield compared to the use of readily available P-fertilizers. Differences in yield are mainly explained by the soil phosphorus content of the control plot and only marginally by the applied amount of P-fertilizer. However, after omitting P-fertilization,the soil phosphorus content develops differently from site to site. Using classification and regression tree approaches, multiple linear and nonlinear regression and mixed models we have analyzed the impact that site specific parameters such as plant available P, crop type, soil pH, SOM, soil texture and precipitation have had on sustaining yields when P fertilization has been suspended. The results aim to specify the current P fertilizer recommendation scheme in Germany. The work is part of the ongoing ‘InnoSoilPhos’ project and builds upon a recent meta-study by Kuchenbuch&Buczko(2011).

Keywords: *Phosphorus, fertilizer, meta-analysis, field-trial.*

THE IMPACT OF LONG-TERM CROP ROTATIONS ON SOIL CONTENT OF ORGANIC MATTER AND ACTIVITY OF MICROORGANISMS IN THE RAIN-FED AGRICULTURE IN NORTH-EASTERN SYRIA

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Abstract

This paper reports on the 30-year experience of long-term crop rotations carrying out in north-eastern Syria at the Al-Qamishly Agricultural Research Center on the total area of 44.2 ha. The researchers in the agricultural season 2014-2015 studied the impact of these rotations on the soil content of organic matter, as well as on the microbiological activity. The results showed the proportion of organic matter in the soil, where the percentage ranged from 0.9-2.3%. In the season 2014-2015, the largest proportion came in wheat/vetch hay treatments (2.3%), followed by wheat/Medic (2%), wheat/vetch grazing (1.9%), wheat/vetch seed (1.6%), wheat/lentil (1.5%), wheat/wheat (1.3%)and wheat/Fallow (1.1%). The fungus and bacteria isolated from the soil ranged between 4.2×10^3- 8.5×10^5 spores/g soil. It was highest in wheat/Vetch hay transactions and the subsequent treatment of wheat/ Fallow, While the fungal count and density were less than 3.4×10^4 spore/g. Also 26 fungal species were isolated and classified. It was the largest number of species follow the genera *Aspergilus* (7 species), followed by *Penicillium* (5 species) and then *Fusarium* (4 species) and then *Alternaria* (3 genera), and two of each *Rhizopus* and *Cladosporium* while isolating one species for each of the genera *Stemphylium*, *Mucour* and *Trichoderma* addition to the three bacterial species belonging to the genus Bacillus.As it has been the highest frequency of the species *A.niger, A.flavus, P.atramentosum, P.cyclopium, R.solonifer, Al.tenuis, F.moniliforme*, *Bacillus* spp. As a result, that the application of agricultural rotation in local conditions improves soil characteristics and increases the activity of microorganisms, which will reflect positively on increasing the yield per unit area and the sustainability of agricultural soils.

Keywords: *Al Qamishly, crop rotations, fungus, soil organic matter, Syria*.

HOW COULD BE AFFECTED SEED GERMINATION RATES OF WINTER CEREALS

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Abstract

Seed germination is the most critical stage in life cycle of cereal plants while temperature is the main factor affecting plant growth and development. In this study, was investigated the effect of different temperatures and the use of two new ingredients for seed dipping of winter cereals (*Triticum durum, Triricum aestivum, Avena sativa, Hordeum vulgare,* and *Secale cereale*). Seed germination rate was measured at different temperatures in the range 2-22^{o}C in a growth chamber with constant parameters (light, water). In each species there were three treatments (blanc, ingredient A, ingredient B) which were repeated four times for each temperature value, where 200 seeds were placed in different separate containers. The measurements were taken at a-day intervals for the increased temperatures and at a three-day interval for the low temperatures. A seed was deemed to have germinated when at least 1 mm of radicle was visible.Temperature seems to be the most limited factor on germination process while the increase of 5 degrees is enough to give better germination results and in association with the dippedseeds with the tested ingredients shown that winter cereals had different germination rates which may help farmers to have a substantial germination risk. It was found that ingredients A and B did not play a significant role in germination except the case of Triticum durum where helped it to present better germination rate than the blanc treatment. The temperature of 12-22^{o}C represents the optimum seed germination in a period of 8-10 days for *Triricum aestivum, Avena sativa, Hordeum vulgare,* and *Secale cereale* regardless of the different treatments.

Keywords: *Germination rate, winter cereals, temperature, ingredients.*

EFFECT OF SEED COATING, MICROFLORAL AND FOLIAR FERTILIZERS ON WHEAT AND BARLEY YIELD

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Abstract

Wheat and barley are the most common cereals which are the most widely grown of all crops, and the cereals with the highest monetary yield. Plant breeders produced many varieties in case to increase the harvested yield, to reduce the plant's sensitivity but also to improve the final quality. Moreover, many chemical substances are sold stating that they can increase the final yield and the seed quality and more specifically the protein content. For the purposes of this study the effect ofwheat seed coating, the use of micro-floral fertilizer during barley's seeding and foliar fertilizerswas investigated on the growth and final yield of wheat and barley, grown on a fertile clay loamy soil at Velestino (Thessaly plain) area in central Greece in the year 2016-17.It was demonstrated that the treatment with coating wheat seeds and the use of micro-floral fertilizer to barley's seeds during seeding, obtained quicker germination and reached significantly higher biomass during the early growing stages. This earlier germination of the above cereals may be helpful for farmers who live in rather cool micro-environments, and their sowing in the fall may be postponed for some weeks without substantial germination risk.

Keywords: *Wheat, barley, yield, chemical substances, Greece.*

HIGH EFFICIENT SOMATIC EMBRYOGENESIS DEVELOPMENT FROM LEAF CUITURES OF CITRULLUS COLOCYNTHIS (L.) SCHARD

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Abstract

We reported an efficient somatic embryogenesis and plant regeneration system using leaf cultures of Citrulluscolocynthis (L.) and assessed the effect of plant growth regulators on the regeneration process. Initially, leaf explants were cultured on Murashige and Skoog medium supplemented with different concentrations of auxins viz., 2,4-dichlorophenoxyacetic acid, 1-naphthaleneacetic acid, gibberellic acid alone and along with combination of 6 benzylaminopurine. The different forms of calli such as compact, white friable, creamy friable, brownish nodular, green globular and green calli were induced from the leaf explants on MS medium containing different concentrations of auxins and gibberellins. Subsequently initial calluswas subcultured at 1.5 mg L-1 BAP + 1.0 mg L-1 2,4-D which resulted in 25 % somatic embryos from 85 % nodular embryogenic nodular callus with highest percentage. Similarly the lowest percentage of somatic embryos was recorded at 2.5 mg L-1 BAP + 0.5 mg L-1 NAA from 55 % embryogenic globular callus i.e., 16 %. High frequency of embryo development takes place at intermittent light when compared with continuous light in the individual subcultures. The cotyledonary embryos were developed into complete platelets on MS medium. In vitro regenerated plantlets were washed to remove the traces of agar and then transferred to sterile vermiculite and sand (2:1) containing pot.

Keywords: *Citrulluscolocynthis, Somatic embryogenesis, Embryogenic callus, Explants.*

ACCURATION TEST OF "PINANGGAL DWASA AYU" METHOD TO DETERMINE CROP ROTATION IN BALI PROVINCE (INDONESIA)

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Abstract

Agriculture is one of the most contributing sector that support Indonesia's economic growth, placing in second highest contributor in GDP (Gross Domestic Product) in Indonesia (BPS, 2016). The importance of agriculture in Indonesia triggers the uprising of local wisdom related to agriculture. One of the so called local wisdom is "Pinanggal Dwasa Ayu" which harness the combination of traditional calendar system. This combination will reflects based on actual climate condition, so it can be utilized to determine crop rotation. This local wisdom system is frequently used by local farmers. While it is widely used, this method is not scientifically tested yet. Based on this condition, it is necessary to research and test the accuration of "Pinanggal Dewasa Ayu" method. Goals of this research is to prescribe the accuration and precision of "Pinanggal Dewasa Ayu" method to determine crop rotation in Bali Province. Expectation is made that this method could help local farmers decide the most effective crop rotation which increase the agriculture productivity in Bali. This research is using Cropwat 8.0 software as testing ware. Cropwat 8.0 is a software which process agroclimate data from FAO (Food and Agriculture Organization). As much as 11 testing is conducted, resulting in 100% accuration and 86.8% of crop planting effectivity. The accuration and effectivity result indicates that "Pinanggal Dewasa Ayu" Method relevance is high and can be used as reference in Bali Province.

Keywords: *"Pinanggal Dewasa Ayu", crop rotation, cropwat, agriculture.*

EFFECTS OF SEED PRIMING WITH GIBBERELLIC AND SALICYLIC ACIDS AND MYCORRHIZAL INOCULATION ON YIELD AND YIELD COMPONENTS OF LENTIL (LENS CULINARIS L.)

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Abstract

Poor germination and weak plant establishment are lentil (*Lens culinaris* L.) production problems in arid and semi-arid areas. Seed priming may provide a solution to these problems by improving the rate and percentage of seedling emergence, establishment of more optimum plant densities and ultimately improving seed yield. A study was carried out to investigate mycorrhizal inoculation with *Glomus mosseae* and *Glomus intraradices* in combination with seed priming. The five treatments included Hydropriming, treatment with GA3100 ppm, salicylic acid 100 ppm, and GA3 100 ppm + salicylic acid 100 ppm as well as non-primed seeds as a control in a factorial experiment using a randomized complete block design with four replications. The experiment was conducted at GonbadeKavoos University in 2013-2014 winter seasons. Mycorrhizal inoculation increased pod number, harvest index, grain yield and the total biological yield. Also, mycorrhiza reduced the number of days to flowering and pod development, and frequency of empty pods. Priming treatments and combination treatment (seed priming + mycorrhizal inoculation) improved seed yield and components of yield. Hydropriming increased seed yield with and without mycorrhiza inoculation; however, hydroprimed seed increased yield when also inoculated with *Glomus intraradices*.

Keywords: *Gibberellic acid, salicylic acid, seed priming, seed yield, seed yield components.*

QUANTITATIVE AND QUALITATIVE EVALUATION OF SEVENTHEEN COLD-REGION ALFALAFA ECOTYPES

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Abstract

This study was carried out in July-Ague 2013 on seed and plant breeding institute farm to determine the nutritive value of 17 superior cold-region ecotypes of alfalfa. The ecotypes included: Chaleshtor, Famenine, Gharah Aghaj, Gallebani, Gharah Ghezloo, Ghahavand, Gharghalogh, Hokm Abad, Koozareh, Malek Kandi, Mohajeran, Ordoobad, Rehnani, Sahand Ava, Sedghian, Shoorkat, Silvaneh. The yield performance of the ecotypes was determined in similar climatic conditions. Chemical analyses were conducted according to AOAC procedure and digestibility of the ecotypes was measured using Tilley and Terry in vitro method. Six superior ecotypes were selected and were analyzed for true protein and non-protein nitrogen. The average height of the plants at harvesting time, the number of stem in m^2, leaf:stem ratio, yield of forage (t/ha), yield of hay (t/ha), crude protein(kg/ha), digestible dry matter(t/ha), digestible organic matter(t/ha), relative feed value were: 77.70, 110.05, 0.85, 14.59, 4.06, 674.18, 2.29, 2.09, 107.67, respectively. The 17 ecotypes were significantly ($P<0.05$) different in height at harvesting time, leaf: stem ratio, performance of forage and hay production, crude protein (kg/ha) and relative feed value. The average of CP, NDF, ADF, Ash, DMI (estimated), DDM, DOM and DOMD for the ecotypes were: 16.61, 48.94, 34.21, 9.68, 2.45, 56.54, 62.21, 52.77, 47.58 percent, respectively; and the differences were significant ($p<0.05$). The average of TP and NPN for the 6 superior ecotypes (Gallebani, Mohajeran, Gharah Ghezloo, Chaleshtor, Sahand Ava, Gharah Aghaj) were 58.77 and 41.22, without significant difference between the ecotypes. It was concluded, that Gharah Aghaj ecotype had the highest yield of Dry Matter compared to the other ecotypes.

Keywords*:* *Alfalfa, cold region, ecotype, interaction effect, quality and quantity.*

MOTIVATORS AND INHIBITORS TO MECHANIZE AGRICULTURE: THE CASE OF PADDY FARMS, IRAN

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Abstract

Rice after wheat is the main component of Iranian's food basket. Despite wide cultivated areas, due to low yield, a major deal of needed rice is imported from other countries. Most of the operations especially transplanting in paddy farms are done through conventional methods. Farmers' preference to perform manually transplanting instead of mechanized form is attributed to the availability of family workforces particularly women as well as seasonal labors at cheaper rates. During recent decade, extension services have introduced rice transplanter machines which highly expected to be adopted by farmers. But majority of farmers were reluctant and behaved neutrally. This dilemma provoked a research study in Fars province, southwest Iran, to investigate the attitude of adopters in compare to those refuse. A random sample of 120 paddy farmers from two villages, similar in all characteristics except the adoption behavior, participated in the study. Farmers were asked to complete a questionnaire examines attitude toward mechanized transplanting, motivators and inhibitors to use rice transplanter. Results revealed the new cheaper method (m= 3.94 out of 5) with high speed of operation (m= 3.92) and yield benefits (m= 3.33) is profitable for adopters. In contrast, non-adopters were reluctant due to small farm size (m=3.38), requirement of expertise in operating the machine (m=3.62) and high confidence to conventional method (m=3.5). Two groups were significantly different in terms of demographical traits, farm size and communication channels. The study proposed a tailoring approach to overcome the problems come through inappropriate nature and essence of innovations.

Key words: *Paddy farmers, rice transplanter, adoption, Iran.*

FOLIAR SPRAY SURPASSES SOIL APPLICATION OF POTASSIUM FOR MAIZE PRODUCTION UNDER RAINFED CONDITIONS

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Abstract

Potassium (K) fertilizer directly applied to soil gets fixed with clay minerals and becomes unavailable to crop plants. Generally, soils have large capacity to provide K to crop plants under normal conditions, but increase in cropping intensity, excessive usages of tube well water and introduction of high yielding varieties have resulted in considerable exhaust of soil K. Foliar application of potassium is more suitable, target oriented and economical technique for increasing the fertilizer use efficiency and grain yield over soil applications. Therefore, present experiment was designed with the objective to elaborate the efficiency and economic benefits of foliar spray for hybrid maize (*Zea mays* L.) under rainfed conditions. Treatments were: control, soil applied 75 kg K_2O ha^{-1}, foliar spray 1% K_2O, foliar spray 2% K_2O, foliar spray 3% K_2O, fertigation 75 kg K_2O ha^{-1}, and split application in soil 75 kg K_2O ha^{-1}. Potassium was applied as potassium sulphate (K_2SO_4). Nitrogen and phosphorus were applied before sowing at the rate of 120 and 90 kg ha^{-1}, respectively, to all the treatments. Foliar applications of potassium were done at 40 and 65 days after sowing. Potassium foliar sprays increased yield and its components as well as grain quality attributes greater than that with soil application, splitting or fertigation. The highest biological and grain yield were 15.0 and 8.08 t ha^{-1}, respectively under foliar treatment of 3% K_2O followed by 2% K_2O foliar spray. Greater net benefit and benefit cost ratio were with foliar applications followed by split application of potassium as compared to traditional soil application and fertigation practices. Foliar spray of potassium at 3% concentration was more efficient for increasing the growth and yield of maize as compared to soil applications of potassium under rainfed conditions.

Keywords: *Crop growth rate, economic returns, fertigation, leaf area index, net assimilation rate, Zea mays L.*

TRIAL NETWORK FOR QUINOA ADAPTABILITY IN CENTRAL-NORTHERN ITALY FOR A QUALITY AGRO-FOOD CHAIN

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Abstract

The need to diversify the present crop rotations to meetthe environmental, economic and social sustainability has directed the attention to alternative crops, such as high nutritional and *gluten-free* crops. Quinoa (*Chenopodium quinoa* Willd.), is a pseudocereal native of Andean regions that is attracting attention worldwide as a functional food. This crop has a good adaptability to different pedo-climatic situations because of the limited nutritional and water requirements. Moreover, quinoa has an excellent balance of essential amino acids and a low glycemic index combined with a good index of satiety, good fiber content and a high antioxidant potential. DISPAA (Università degli Studi di Firenze, Central Italy) started studies of quinoa in 1999 as Italian coordinator of the "*American and European Test of Quinoa*" (FAO-UNA-PERU Program). In Tuscany, over 25 genotypes were compared. Seven highly adaptable populations were selected showing yield level ranging between 0.6 and 2.3 t ha^{-1}. Attention was paid to some lines that produced seeds of greater size. Currently the activities are focused on genetic improvement and three promising new lines, derived from polycross made in 2014, are selected. Since 2014 DIPROVES (Università Cattolica del Sacro Cuore di Piacenza, Northern Italy), has set up trials to assess the adaptability of quinoain Po Valley, testing about 35 genotypes. At the end of three-year period, the best varieties yielded 1 to 3 t ha^{-1}in hillsides areas, while in lowland areas yielded 2 to3 t ha^{-1}. As regard to varietal selection, crossing tests have been on going to maximize the quantitative and qualitative potential to combine the needs of farmers and consumers. Quinoa would be even more interesting in organic farming system and it could represent a farmers' profitable strategy within a new agro-food chain.

Keywords: *Chenopodium quinoa, functional food, new crop, sustainability, organic farming.*

CORYLUS AVELLANA SAPLINGS RESPONSE TO WATER STRESS: ANALYSIS OF PHYSIOLOGICAL AND MORPHOLOGICAL LEAF TRAITS

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Abstract

Corylus avellana L. is one of the world major nut crops, considered a sensitive species to water stress. Knowledge of *C. avellana* response to water stress is important from an economical point of view since water stress may affect fruit production and quality. The aim of this research was to analyze the response of hazelnut saplings to water stress by experimentally withholding irrigation. Saplings were subjected to three different water regimes during the leaf development. Twenty plants were well-watered (WW) and used as control, twenty plants were subjected to a moderate water stress (MS) and twenty to a severe-drought stress (SS). An imposed water stress experiment was carried out on 10 plants for each treatment in July 2015 by withholding the irrigation until stomatal conductance (g_s) was below 0.05 mol $m^{-2}s^{-1}$. The results highlight g_s drops below this threshold after 4 days in WW, 6 days in MS and 7 days in SS. The regression analysis shows a significant linear relationship between g_s and leaf water potential at pre-dawn (Ψ_{pd}) in each treatment, showing also a steeper slope in SS plants, thus suggesting greater g_s responsiveness to Ψ_{pd} variations. Moreover, SS plants develop a 50% lower leaf area, a 25% higher leaf mass per area (LMA) and a 54% higher leaf tissue density (LTD) than WW. On the whole, the results showed that *C. avellana* responded to water stress by developing morphological and physiological adaptations, as confirmed by the greater capacity of SS plants to cope with water stress.

Keywords*: Physiological leaf traits, morphological leaf traits, hazelnut, water stress.*

EVALUATION OF THE COMPOSITION OF WHEAT GRAINS GROWN IN LATVIA AND NORWAY

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Abstract

Wheat is one of the major grains in the diet of the world's population and therefore it may have a great impact on human health. The yield and chemical composition of grains can vary greatly due to genetic and environmental factors. The aim of the present study was to assess how different climatic conditions affect the chemical composition of grains. The field trials were established in Stende (Latvia) and Apelsvoll (Norway). Wheat varieties used were 'Edvins', 'Ellvis' and 'Skagen' In the studied samples the content of protein, amino acids, 1000 grain weight, hectolitre weight and falling number were determined. The protein content in the grains ranged from 8.9% to 11.8% in organic fields and from 10.0 to 13.1% in conventional fields and differed between the varieties. The protein content in the samples of the same variety differed significantly due to environmental conditions. The difference in protein content was greater in the conventional fields. The 1000 kernel weight in the wheat grain samples varied from 39.9 to 49.2 and depended on the variety and the growing place. The ratio of essential amino acids to the total content of amino acids (in %) ranged from 30.8 to 33.3% in the conventional growing system and from 30.5 to 32.9% in the organic growing system. The difference between the varieties was not detected.

Key words: *Organic and conventional farming, amino acids, protein, quality, environment.*

CULTIVATION OF BABY LEAF LETTUCE IN PEAT – PROBIOTIC SUBSTRATE

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Abstract

The objective of this study was to evaluate the effects of peat – probiotic substrate on growth and nutritional value of baby leaf lettuce (*Lactuca sativa* L. 'Alanet'). Lettuces were grown in plastic trays filled with peat – probiotic (10, 25 or 50 present) substrate. Leaf area, fresh and dry weight, chlorophyll and flavonols indexes, free-radical scavenging capacity (DPPH), the total phenols, ascorbic acid, nitrate and mineral content were determined at the end of experiments. Our investigations revealed that 10 and 25 percent probiotic content in peat have no significant effect on aboveground part growth of baby leaf lettuce, but improved root growth. Meanwhile, 50 percent had a negative impact on their growth. Decreased chlorophyll and increased flavonols index under increasing probiotic percentage in peat showed stressful conditions for lettuce, but choosing the relevant probiotic - peat ratio it is possible to improve the nutritional quality of the plant. This is confirmed by higher DDPH and content of ascorbic acid and total phenolic compounds. Such results showed that lettuces containing higher antioxidant and antiradical activity grew in peat substrate supplemented with 25 percent of probiotic. Higher content of probiotic in peat led to higher nitrate content in lettuce, but does not exceed the permissible daily intake. Probiotic content in peat substrate affected the uptake of mineral elements by lettuce. While content of many mineral elements in lettuce increased due to increased probiotic content in peat substrate, such important elements as phosphorus and manganese decreased a few times.

Keywords: *Plant probiotic, peat, baby leaf lettuce, growth, nutritional value.*

Acknowledgment

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NITRATE ASSIMILATION IN TATSOI DEPENDING ON LIGHT INTENSITY AND SPECTRUM

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Abstract

The objective of this study was to evaluate the effects of light intensity and spectrum produced by light-emitting diodes (LEDs) on nitrate assimilation in tatsoi (*Brassica rapa* var. *rosularis*). A system of high-power solid-state lighting modules with 447-, 638-, 665-, and 731-nm LEDs was used. Two experiments were performed: (1) evaluation of LED irradiance levels of 500, 400, 300, 200, and 100 μmol $m^{-2}s^{-1}$ photosynthetically active photon flux density (PPFD) and (2) evaluation of the effects of different combinations of LEDs spectrum. Our results revealed (1) that tatsoi accumulated mostly nitrates at low (100 μmol $m^{-2}s^{-1}$) PPFD. The reduction of nitrates required ≥300 μmol $m^{-2}s^{-1}$ PPFD. Nitrate concentrations strongly correlated with the content of nitrites (r = 0.97 to 0.99). Increasing PPFD resulted in decreasing total protein content, nitrate reductase (NR) activity, but enhancing leaf area, fresh and dry weight, nitrite reductase (NiR) activity, chlorophyll and flavonol indexes. At 500 μmol $m^{-2}s^{-1}$ PPFD photoinhibition symptoms were observed, as total protein content, chlorophyll index, plant biomass and leaf area were reduced. According to obtained data (2), the addition of blue light to red 660- and/or 640 nm LEDs significantly reduced nitrate, but increased nitrite content. The highest total protein content, leaf area and biomass were determined under red and blue (660-, 640-, 445 nm) light. The addition of far-red light to the latter LEDs set caused decrease of total protein content and leaf area. Significant spectrum effect on activity of NR and NiR was not established.

Keywords: *Light spectrum*, *Light intensity*, *Light emitting diodes*, *Nitrate and nitrite reductase activity*, *Total proteins*, *Tatsoi.*

Acknowledgment

This research was funded by a grant (No. MIP-60/2015) by Research Council of Lithuania.

THE INFLUENCE OF MINERAL NITROGEN NUTRITION ON NITRATE ASSIMILATION IN GREEN VEGETABLES

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Abstract

The aim of this study was to evaluate the influence of mineral nitrogen nutrition on nitrate accumulation and its assimilation processes in various green vegetables. The experiment was conducted in closed growth chambers. Green-leaf lettuce (*Lactuca sativa* 'Lojobits Green Cos'), tatsoi (*Brassica rapa var Rosularis* 'Rosetto' F1), corn salad (*Valerianella Locusta* 'Verte de Cambrai') and amaranth (*Amaranthus bicolor* 'Red Army') were regularly irrigated with an equal quantity of water (reference) and two different concentration of the ammonium nitrate solution (0.2% or 0.4%). Biometric measurements and biochemical analyses were performed at the stage of plants' technical maturity. According to the obtained data, all the investigated plants were subjected to accumulate nitrates and nitrites as they were irrigated with the ammonium nitrate solution relative to the reference plants. However, nitrate and nitrite accumulation in the plant tissues depended on the concentration of the applied ammonium nitrate solution. The lettuce, tatsoi, corn salad and amaranths accumulated a significantly higher content of nitrates at irrigation with 0.2% ammonium nitrate solution in comparison to the variant with 0.4% ammonium nitrate solution. A considerable high level of nitrite accumulation was found in the tatsoi and corn salad irrigated with 0.4% ammonium nitrate solution. The irrigation with ammonium nitrate solution resulted in the increased content of total proteins and the nitrogen balance index in the plant tissues. The significantly higher chlorophyll index was determined in the corn salad and amaranth leaves, while flavonol indices was reduced in all plant species under nitrogen nutrition. The nitrogen nutrition resulted in an elevated photosynthetic rate in all plants, but there was no significant positive effect on biomass accumulation, except for plant height, since those plants were taller than the reference plants.

Key words: *Nitrate, nitrite, total protein content, nitrogen balance index, photosynthetic rate.*

Acknowledgment

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THE EFFECTS OF OZONE IN CHANGING CLIMATE ON SPRING BARLEY UNDER THE COMPETITION OF WILD MUSTARD

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Abstract

Competition is an important factor affecting plant responses to ozone stress. Under global climate change scenarios, spring barley confronts not only ozone stress but also the threat caused by weeds, such as wild mustard. This study aims to investigate the effects of ozone stress in ambient air and warmed climate on spring barley and wild mustard under competition. Wild mustard was highly competitive to spring barley; at the presence of weeds, the fresh mass, dry mass and assimilating leaf area of the spring barley decreased compared with those growing singly in the ambient air. The competitive effect from the wild mustard exacerbated as the spring barley was exposed to ozone, and especially great biomass loss was determined under the ozone fumigation in warmed climate conditions; fresh biomass decreased by 45%, dry biomass – 39%, assimilating leaf area – 36%. The competition from the wild mustard under ozone fumigation in the warmed climate resulted in a significantly reduced (by 20%) photosynthetic rate of the spring barley. Moreover, the antioxidative system activity in the spring barley was seriously depressed by ozone and wild mustard competition. In the ambient air, ozone exposure and competition effect significantly reduced the activity of catalase, glutathione reductase and superoxide dismutase in the spring barley. The activity of catalase and superoxide dismutase was also significantly reduced in the spring barley as they grew in competition under elevated ozone in the warmed climate. Our results demonstrated that spring barley is more sensitive to competition under increasing ozone in warmed climate, providing valuable data for further investigation on responses of these plants to ozone pollution combined with species competition.

Key words: *Hordeum vulgare* L., *Sinapis arvensis* L., *growth, gas exchange, antioxidant enzymes, phenolic compounds.*

Acknowledgments

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EFFECT OF PROBIOTIC COMPOSITION ON WINTER WHEAT GROWTH IN EARLY PHASES

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Abstract

The use of biological agents, i. e. probiotic microorganisms can be the potential alternative to chemical fertilizers in crop production and can help to avoid harmful impact on soil. Probiotic composition promotes reproduction of useful micro-organisms in the agricultural environment, thus aiding sustainable agriculture with minimum impacts on the environment. The goal of this paper was to study the effect of probiotic microflora on winter wheat (*Triticum aestivum* L.) growth and development. Commercial probiotic composition Probio Humus, "Baltic Probiotics", Latvia was used. The microbiological content of this composition is: *Lactobacillus* spp., *Bifidobacterium* sp., *Rhodopseudomonas* spp., *Bacillus subtilis*, *Lactococcus lactis***.** Treatment of plants with probiotic composition included seed coating and soil spraying. Plants were grown under controlled conditions. The functioning of plant roots and shoots were assessed by morphometrical and physiological methods. Comparison of 16-day-old winter wheat plants grown without the probiotics and with them was promoted. Results of this research showed potential benefit for root and shoot formation. Plants grown with probiotics were by 12% taller, in case of spraying, and by 5% taller in case of seed coating. Shoot growth reached 4-5% increase in fresh mass and 9% in dry mass formation. The net of roots grown with probiotics was larger and formed 6% increase in dry mass. The way this probiotic composition interacted with the plant was studied. Some may transfer through seeds and others through the environment. This study will be in long-term commitment in field conditions collaborating with an agricultural company.

Keywords: *Microorganisms, roots, shoots, Triticum aestivum* L.

PHYTOHORMONE PATTERN IN THE SECOND GENERATION OF PURPLE CONEFLOWER (ECHINACEA PURPUREA) GROWN FROM COLD PLASMA- AND ELECTROMAGNETIC FIELD-TREATED SEEDS

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Abstract

Purple coneflower, *Echinacea purpurea* (L.) Moench, is one of the most widely used medicinal plants and dietary supplements, therefore, numerous methods are used for plant quality improvement. We have reported for the first time that pre-sowing seed treatment with physical stressors - cold plasma (CP, 2-7 min) and electromagnetic field (EMF, 5-15 min) - induce not only changes in germination and plant growth but also increase in amounts of biologically active constituents (cichoric acid, vitamin C) and antioxidant activity in leaves up to 3-fold. The seeds from plants grown from CP- and EMF-treated seeds were collected and studied for persistency of treatment effects in the second generation. Seedlings height and weight was higher as compared to control in all treated groups. Seedlings were further subjected for extraction of plant hormones, also known as phytohormones, in order to investigate their involvement in plant "memory" mechanism. Phytohormones play essential roles (individually and in combination) in the regulation of myriads of physiological processes involved in plants' growth, development and responses to environmental stimuli. In this study, four types of plant hormones were quantified by HPLC in the extracts of seedlings: auxins (indole-3-acetic acid (IAA), indole-3-butyric acid (IBA)), cytokinins (zeatin (Z)), gibberellins (gibberellic acid (GA3), gibberellin A7 (GA7)), and stress-related hormones (abscisic acid (ABA), salicylic acid (SA)). Complex changes in phytohormone amount and ratios in CP and EMF treated groups proved their role in the mechanism of plant enhancement maintenance and transfer to the next generation.

Keywords: *Echinacea purpurea, pre-sowing seed treatment, cold plasma, electromagnetic field, phytohormones.*

POSSIBILITY OF GRAFTING PROPAGATION OF HONEYBERRY (LONICERA CAERULEA L.)

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Abstract

The propagation ability of Honeyberry (Lonicera caerulea L) is investigated. Honeyberry is characterized with specific dependence from high soil moisture. For that reason this new fruit kind cannot be spread in semiarid condition of sub-Mediterranean climate of Republic of Macedonia. In relatively dry climate conditions, low, stunted and infertile shrubs of Honeyberry are derived. In this investigation is using rootstock which is drought tolerant, such as Winter Honeysuckle (Lonicera fragrantissima Lindl & Paxton). Two grafting techniques (T budding and chip budding) over one year old suckers from the rootstock Winter Honeysuckle in two periods – June budding (June) and fall budding (August) have been used. The grafting acceptance and the plant growing have been investigated. The plants from Honeyberry (Lonicera caerulea L.) obtained as rooted cuttings have been used as a control. The best percent of acceptance has been achieved in chip budding technique (86%). The June budding is more efficient in average (78%). The biggest grow at the grafting plants has been noted with the June budding, which has been almost twice bigger than the growing of the control plants.

Key words: *Lonicera caerulea L., Lonicera fragrantissima Lindl & Paxton, budding, rootstock, sucker.*

THE NUMBER OF MICRORGANISMS IN SOIL DURING PRODUCTION OF CAULIFLOWER (*BRASSICA OLERACEA* L. *VAR. BOTRYTIS*) WITH USE OF MICROBIOLOGICAL FERTILIZER

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Abstract

The experiment was conducted in order to determine the influence of the microbiological fertilizer Slavol on the number of microorganisms in the soil where cauliflower was grown in open field. We used the variety Barselona F1 which has been growing in Skopje region (Republic of Macedonia) during three years (2011, 2012, 2013). The treatments were as follows: Ø control-without use of microbiological fertilizer, V-1 -foliar treatment every 7 day with 0,1% solution of Slavol and V-2 -drip irrigation treatment every 2 days with 0,1% solution of Slavol. The total number of bacteria and the number of examined physiological groups of microorganisms in the rhizosphere (nitrogen fixing bacteria 10^{-4}, cellulolytic microorganisms 10^{-4}, yeasts 10^{-4}, nitrifying microorganisms $10^{-4}$and molds 10^{-3}) were counted. According to the results during three years examination, the highest average number of total bacteria was determined in the variant V-1 and V-2 in comparison to control and the soil before planting. The number of nitrogen fixing bacteria was from 4863519 in V-1 to 4923807 in V-2. The number of cellulolytic microorganisms was from 3288588 in V-1 to 3312114 in V-2. The number of yeasts was lower than in control (3813208) and was from 3681506 in V-1 to 2585089 in V-2. The number of nitrifying microorganisms was very high in V-1 (7502534) and V-2 (7323212) in comparison to control (1331717) andfallow land. The number of molds was higher in V-1 (422192) and V-2 (352608) in comparison to control (340149) but lower in comparison to fallow land (474851).

Keywords: *Cauliflower, microbiological fertilizer, groups of microorganisms, rhizosphere.*

EFFECTS OF POST-HARVEST PROCESSING ON FATTY ACID COMPOSITION OF SAFFRON (*CROCUS SATIVUS* L.)

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Abstract

Saffron is the most expensive spice in the world. It is made from the dried stigmas of the saffron flowers (*Crocus sativus* L.), and is widely used in food and pharmaceutical industries. During the last decades chemical composition of saffron is subject of increased interest of research. Post-harvest processing has a considerable influence on chemical composition of saffron. Different treatments used for draying of stigmas have different impact on chemical composition of saffron. The aim of this study was to analyze the influence of different draying treatments which involve different temperature, with or without air flow on fatty acid composition of saffron. Saffron samples produced with different draying treatments were taken from markets in Hungary, Greece and Spain. Fatty acid composition was analyzed using Agilent 7890 gas chromatograph with a flame ionization detector. Reliability and accuracy of the analytical method for the detection of fatty acids was ensured by use of the certified reference matrix consisted of mixture of 37 FAME standards (Supelco 37 Component FAME mix, Sigma-Aldrich). The content of the particular component was expressed as percentage from the sum of all analyzed fatty acids. According to the obtained results from analysis of fatty acid profile of saffron samples it was noted that saturated fatty acid in highest content were present in Hungarian samples [31.69% more than Greek, and 49.15% more than Spanish samples($p<0,05$)]. The post-harvest processing such as draying treatment is very important step which determines stability, quality, and economical value of the saffron.

Key words: *Saffron, FAMEs, GC-FID.*

ALLELIC DIVERSITY OF GLUTENINS SUBUNITS IN MOROCCAN DURUM AND BREAD WHEAT AND THEIR RELATIONSHIPS WITH GLUTEN STRENGTH

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Abstract

Wheat endosperm storage proteins, particularly glutenins, are the major components of gluten that determine wheat dough processing qualities. The genetic variability of high (HMW) and low (LMW) molecular weight glutenins using Sodium Dodecyl Sulfate Polyacrylamid Gel Electrophoresis (SDS-PAGE) was analyzed for forty three Morrocan wheat varieties including twenty three durum wheat (*Triticum durum*) varieties and twenty of bread wheat (*Triticum aestivum*) varieties. Gluten strength was assessed by SDS sedimentation test and Zeleny volume for durum and bread wheat respectively. The analysis of the glutenin composition for durum wheat revealed the presence of six alleles: silent "c" allele for the Glu-A1 locus noted in all durum wheat varieties and five alleles for the Glu-B1 locus: Glu-B1b, Glu-B1e, Glu-B1d, Glu-B1a and Glu-B1c alleles. For bread wheat varieties, electrophoretic analysis showed the presence of ten alleles: three alleles for the Glu-A1 locus; Glu-A1c, Glu-A1a, and Glu-A1b, five alleles at Glu-B1 locus; Glu-B1b, Glu-B1c and GluB1i and two alleles (a),(b) at Glu-D1 locus. Furthermore, results showed significant differences between the durum and bread wheat varieties for gluten strength. Significant association has been found between HMW and LMW glutenins subunits composition and gluten strength. Proteins HMW subunits Glu-A1b, Glu-B1c, Glu-B1i, and LMW-Type 2 subunits were found positively correlated with gluten strength. The allelic identification of glutenins subunits and their association with gluten strength constitute an important tool in wheat breeding program for the improvement of bread and pasta making quality of bread and durum wheat.

Keywords: *Wheat, glutenins, allelic diversity, gluten strength.*

EFFECTS OF SEED PRIMING AND MAGNETIC STIMULATION ON CROP STAND, FLOWER YIELD AND QUALITY OF THE *ZINNIA ELEGANS* JACQ

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Abstract

The study was conducted to evaluate the efficacy of various seed priming and magnetic stimulation treatments on crop stand uniformity, cut flower production and quality of the zinnia *(Zinnia elegans* Jacq.). The effect of priming and magnetic seed stimulation treatments were first evaluated in two laboratory experiments and then compared in a field trial to determine the best treatments for flower production and quality. The treatments were comprised of non-treated seeds (control) and seeds primed with distilled water, 3% Moringa leaf extract (MLE), water magnetically treated for ten minutes, or 3% MLE prepared by using magnetically treated water for 10 min. All priming treatments were applied for 24 h followed by drying of seeds under shade to their pre-treatment weight. The second experiment comprised magnetic stimulations of seed in a magnetic field of 25, 50 and 75 mT for 5, 10 and 15 min. In the laboratory experiment on priming, 3% MLE had the highest germination rate and root length, while hydro-priming had the highest shoot length, seedling fresh weight and seedling vigor index. For the experiment on magnetic stimulation, the seeds stimulated at 25 mT for 10 min had an increased root length and seedling vigor index, the seeds stimulated at 50 mT for 5 min had an accelerated germination rate, while the seeds stimulated at 75 mT for 10 min had the highest shoot length and fresh weight, compared to the untreated controls. In the field trial, priming with 3% MLE increased the number of branches and dry weight of flowers and improved flower quality when compared to the untreated controls, while the seeds treated with 3% MLE prepared by adding magnetically treated water produced the highest plant height, plant canopy diameter, maximum number of flowers, internode length, leaf area and flower fresh weight. The seeds treated with magnetically treated water had an increased stem diameter, plant fresh weight and plant dry weight compared to the untreated controls. In summary, priming zinnia seeds with 3% MLE improved the stand uniformity of crops and enhanced the flower yield and quality of the zinnia, so this can be used by growers to increase their profitability.

Key words: *Bedding ornamentals, germination, Moringa leaf extract, seed enhancement.*

ENVIRONMENT EFFECTS FOR EARLINESS AND YIELD TRAITS IN F_1 DIALLEL POPULATIONS OF MAIZE (*ZEA MAYS* L.)

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Abstract

Five maize inbred lines, 20 F_1 diallel hybrids, and two check genotypes were evaluated through G × E interaction and GGE-biplot for earliness and yield traits at four different locations including two each in plain areas (CCRI and Haripur) and hilly areas (Mansehra and Swat) of Pakistan. Genotypes (G), locations (E) and G × E interaction (GEI) showed highly significant differences for all the traits. In total sum of squares, environments and genotypes played primary role followed by GEI. Larger effects of environment and genotypes to total variation persuade the earliness and yield traits. However, according to GGE biplot, first two principal components (PC1 and PC2) explained 95% of the variation caused by GE interaction. GGE-biplot confirmed the differential response of genotypes across environments. F_1 hybrid SWAJK-1 × FRHW-3 had better stability with good yield and was considered as ideal genotype. F_1 hybrid FRHW-2 × FRHW-1 showed more earliness at two locations i.e., CCRI and Haripur, followed by PSEV3 × FRHW-2 and its reciprocal at two other locations viz., Swat and Mansehra, respectively. F_1 hybrids FRHW-1 × SWAJK-1, PSEV3 × SWAJK-1 and SWAJK-1 × FRHW-3 at Mansehra and Swat produced maximum grain yield, followed by SWAJK-1 × FRHW-1 and PSEV3 × FRHW-1 at Haripur and CCRI, respectively. Overall, maize genotypes showed early maturity at plain areas (CCRI and Haripur) and higher yield in hilly areas (Mansehra and Swat) of Pakistan.

Keywords: *Genotype by environment interaction, white kernel maize F_1 diallel hybrids, earliness and yield traits, total sum of squares, Zea mays L.*

MEASURING THE IMPACT OF SLCAL PROJECT INTERVENTION ON TARGET FIELD CROPS IN GAZA STRIP, PALESTINE

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Abstract

The experiment consisted of five varieties of field crops: wheat, barley, lentils, chickpeas and vetch. It was conducted in three different areas of the Gaza Strip (Palestine). The main idea of the experiment was to study the best varieties in terms of productivity in each target area according to the analysis of a number of different factors including climate and soil. The experiment was also aimed at determining the extent to which the Strengthening Livelihoods through Community Adaptation and Learning (SLCAL) project contributes to the productivity of field crops by comparing the productivity rates associated with the project interventions with control groups that were implemented without intervention. The experiment relied on the experimental approach in the implementation process, which included zoning of experimental units and control units where the areas were divided according to the complete randomized sectors design. The eight target crops were planted in each experimental unit with one type of field crop per each preview unit. This mechanism was applied to all of the experimental areas. The project interventions included spraying of the Germination Inhibition Herbicide before starting the cultivation of the various crops. In addition, the compound fertilizer (NPK 13.13.13), herbicides were distributed to combat thin and broad herbs. Data was collected from primary sources including various control sites and readings were recorded for the various crop varieties in terms of seed weight, straw weight, total weight, length of the ears, numbers of branches, lengths of crops and weights of a thousand seeds. The same data was collected from the project intervention areas and soil samples were collected at a depth of 30 cm from all areas. The comparative quantitative method was used to analyze the results of the project and the experiment in another word the control without any intervention. The results showed positive effects of the project interventions at the level of productivity for all field crop varieties.

Keywords: *Field crops, cultivation, productivity, interventions, agricultural pesticides.*

THE POTENTIAL ACCLIMATION OF CUCUMBER LINES TO WATER DEFICIT

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Abstract

The cucumber is a common vegetable that prefers higher temperature for germination and growth. For this reason it is sown relatively late, at higher temperature and under intensive solar radiation. The plant develops a shallow root system and in shallow soil it suffers stress from water deficit due to insufficient and irregular rainfall. The study was conducted to investigate physiological and biochemical changes in 8 cucumber lines at the seedling stage, which were grown in a greenhouse - Skierniewice, Poland (2015/2016). Soil drought was induced by withholding the water supply for 7 days and reducing the water potential to -40 kPa. The control plants were well watered and kept under the water potential of -5 kPa. Soil drought decreased the growth and development of cucumber seedlings. The height of the plants as well as the mass of their roots and stems were reduced in comparison with the control samples. The highest reduction was observed in the root mass, where as the growth and the stem mass were less reduced. The physiological parameters - photosynthesis, transpiration intensity and stomatal conductance were also significantly reduced in the plants exposed to the water stress. There were noticeable changes in some biochemical parameters. The water deficit intensified ROS generation, superoxide radical ($O_2^{\bullet-}$) by 245% as compared with the well-watered control plants. Other changes included the polyamine (PA) level – the stress caused intensive accumulation of spermidine and cadaverine and it reduced the content of putrescine and spermine. To sum up, apart from relatively good morphological parameters during the soil drought, lines SU8 and SU9 wilted significantly and their photosynthetic parameters decreased. The dehydration also caused biochemical changes - intensive ROS generation and PA accumulation. The changes indicated that these lines had lower potential to acclimate to water deficit and they were classified as sensitive.

Key words: *Cucumber, photosynthesis, polyamines, ROS, transpiration.*

CONTENT OF VITAMIN C, BETA-CAROTENE, POTASSIUM AND PHOSPHORUS IN THE LOCAL PEPPER POPULATIONS

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Abstract

The purpose of research is to highlight the content of vitamin C, beta-carotene, potassium and phosphorus in the eight local pepper populations in southern Oltenia, Nettle and Ianca localities Romaniaon two different soils as a structure. Because the soil plays a decisive role in the cultivation, development and production of significant crops in the pepper crops studied, the agrochemical determinations carried out on the soil confirm the importance of knowing its composition and especially the accessibility of the nutrients from the organic soil reserve. The actuality of this research results from the need to fully know the nutritional value potential of pepper in the areas studied. Acquiring these results will help future vegetable and nutritionists, develop a broad range of organic products for food, cosmetics, pharmacy and health. In this way, the knowledge of the biochemical composition of the peppermint fruit comes in addition to the vitamin requirements required by our body but also used as a biostimulator of blood circulation in treating various colds, sore throats, relieves rhinitis, treats gingivitis, regulates Blood pressure, intensifies poor peripheral circulation, prevents gastric ulcer and especially in rheumatic treatment.The naturist remedies as well as the culinary ones recommend the pepper to be enumerated as one of the main vegetables from Romania which are very sought and consumed. The purpose of the paper is to develop the theoretical and practical bases for highlighting the role of chilli pepper in the development of the food industry, the pharmaceutical industry, cosmetics and health, the use of the biochemical composition of chilli peppers, the determination of the growth potential of these industrial branches and the argumentation of some proposals for efficiency Use of chilli pepper properties for multiple purposes.

Keywords: *Pepper, beta-carotene, potassium, phosphorus.*

BIOTECHNOLOGICAL APPROACHES FOR BREEDING PROGRAMS IN VEGETABLE CROPS

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Abstract

The plant cell and tissue culture *in vitro* is the one of promising approaches for modern breeding programs in vegetable crops. The double haploid lines (DH-lines) were produced thought isolated microspores in species of Brassicaceae, namely in Chinese cabbage, broccoli, white head cabbage, red head cabbage and kohlrabi, where the yield of embryoids was up to 40 per a flower bud. Moreover, DH-plants were produced in such species as *B. alboglabra* and *B. purpuraria* with the yield of embryoids up to 200 per a flower bud. DH-lines in different varieties and interspecific hybrids of pepper were obtained through the culture of isolated anthers and microspores with the yield of 54.5 embryoids per 100 anthers cultured. The technology of the DH-line production was optimized for different carrot breeding accessions and totally 84 embryoids per one Petri dish were obtained in culture of isolated microspores. The regenerated plants of carrot showed game to clonal variation confirmed by morphological and DNA analyses. The technology of DH-plant production from isolated unpollinated ovules and ovaries have been developed in plants of Cucurbitaceae family such as cucumber, marrow, pumpkin with the yield up to 20, 55 and 9 embryoids per an ovary respectively. Additionally, plants originated from unpollinated ovule culture were obtained in carrot, onion and red beet. As a result of breeding program realized with the use of DH-lines, hybrid F1 of kohlrabi 'Dobryniya', sweet pepper 'Nataly' and 'Gusar', and a carrot variety 'Sonata' have been released. Meristem plant culture was used to produce polyploid virus-free breeding accessions in garlic. Clonal micropropogation technique was developed to multiply plants in large quantity with male sterility in cabbage. Furthermore, the technologies of micropropagation in eggplant and sweet pepper served as basis to develop the method for embryo rescue used for production of their interspecific hybrids.

Keywords: *DH-plants, microspore culture, unpollinated ovary culture, micropropagation.*

SOME MORPHOPHYSIOLOGICAL FEATURES OF LAVANDER CULTIVAR MICROPROPAGATED *IN VITRO* BY MERISTEM CULTURE

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Abstract

The data about some morphophysiological peculiarities of explants of lavender (*Lavandula angustifolia* Mill.) the cultivars Stepnaya, Sineva, Vdala, Record, Rannyaya, introduced by meristems in aseptic conditions and under long-term micropropagation *in vitro* are presented. During cultured meristems on Murashige and Skoog medium with 1.0 mg L^{-1} Kinetin and 0.5 mg L^{-1} GA_3 all cultivars have formed the multiple shoot. The maximum number of microshoots at *in vitro* introduction stage was in the cultivar Sineva (5.7), and minimum – in the cultivar Rannyaya (3.9). Further, microcutting of main and additional shoots was conducted every 30-35 days. Obtained shoot segments with one node on MS medium with 1.0 mg L^{-1} Kinetin and 0.5 mg L^{-1} GA_3 were cultured. When micropropagation of lavender follow 6^{th} subculture it was shown that the number of shoots was increased in all cultivars till 3 subculture, and then it was decreased. In the cultivar Sineva the maximal multiplication index (12.2) was noted at the third passage, and then changed from 11.5 to 7.4. The lowest multiplication index at $5\text{-}7^{th}$ passages was in the cultivar Record (3.8-4.5). Analysis of water regime of obtained microshoots at 6^{th} subculture showed that the total water content was 83-89%, and the fraction of bound and colloid-absorbed water was 40-57%. Maximum values of water-holding capacity in the cultivars Record, Rannyaya and Vdala were found. Studying the parameters of light-induction processes it has been showed that the cultivars Vdala and Sineva were characterized by maximum photosynthetic activity of leaves and shoots, and they had high viability index.

Keywords: *Lavandula angustifolia, clonal micropropagation, multiplication index, water regime, photosynthetic activity.*

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SEED LIFE CYCLE MANAGEMENT

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Abstract

Seed lifecycle management of corn, sunflower and sugar beet is discussed from marketing standpoint; and includes the market introduction phase, growth, maturity, and decline one. The market needs pipeline of varieties with higher added value, i.e., with competitive advantage compared to existing ones. The breeder has to be aware about value chain needs and pain points, and processing industry ones as well. Improve the return of investment to the breeding program based on improved turnover of seeds, royalty collection harmonization for certified seeds, and for the farm-saved seeds too. Knowledge of seeds life cycle characteristics allows to be more efficient in portfolio management, i.e. to adjust product pipeline to value chain needs. Variability of life cycle stages is one of its strategy implementation disadvantages. Recommended for specific stage strategy does not always aligned with expected result due to some uncertainties related with them.

Keywords: *Seed lifecycle, royalties, return of investment, breeding.*

THE ROLE OF INTERCROPPING IN YIELD POTENTIAL OF WINTER PEA/OATS DEPENDING OF LEAF TYPE

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Abstract

In this study we examined two types of field pea (afila – semi-leafless and the normal type) in two mixtures (85:15% – field pea:oats; 70:30% – field pea:oats). The goal was to compare the normal and the afila type in two different proportions with oats, as well as compare them with single crops. The relations between mixed crops were evaluated on the basis of yield, land equivalent ratio – LER, aggressiveness – Ag, actual yield loss – AYL and system productivity index – SPI. The obtained results show that there were no statistically significant differences between the yield of oats across various combinations of both types of pea or the calculated values for Ag, AYL and LER. Differences were found between combinations and monocultures, yield of the field pea and SPI feature at a 0.01 statistically significant level. Yield for the normal type of field pea was higher in mixtures than in a single crop. Yield values were higher in all combinations for the normal type of field pea (26.86 t ha^{-1}) compared to the afila type (10.48 t ha^{-1}). On average, higher efficiency in the utilization of land (LER) compared to the single crop was observed in the combination with the normal type of field pea. Oats also showed higher yields in combination with normal field pea (3.06 t ha^{-1}) compared to the afila type (1 t ha^{-1}) on average. Aggressiveness (Ag), actual yield loss (AYL) and system productivity index (SPI) were higher for mixtures of normal field pea and oats (70:30%), which indicates the priority of establishing crops of normal types of field pea and oats. Based on the obtained results, we may conclude that semi-leafless types are better for monoculture, while normal types are better for higher yields and mixtures with oats.

Key words: *Competitiveness, field pea, intercrop, oats, yield.*

CHARACTERIZATION OF ESSENTIAL OIL FROM TWO CULTIVARS *SATUREJA MONTANA* L. GROWN IN THE REPUBLIC OF SERBIA

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Abstract

Two cultivars of savory (*Satureja montana* L.) grown in the Republic of Serbia have been characterized on the basis of their essential oils obtained by the method of hydrodistillation. Analyses of the chemical composition of the essential oils were performed with GC/MS. Forty two compounds were identified in the first savory cultivar (S1) (28 monoterpenes and 14 sesquiterpenes), representing 93.57% of the total oil content. The major fraction was monoterpenes with 85.81% of the total identified compounds. The oxygen-containing phenolic monoterpene carvacrol (37.26%) was found to be the main constituent of the investigated essential oil, followed by thymol (15.63%), p-cymene (9.09%), isothymol methyl ether (4.59%) and γ-terpinene (3.15%). In a smaller percentage there were also borneol (2.58%), β-terpineol (2.47%) and caryophyllene (2.11%). In the essential oil of the second savory cultivar (S2) from the twenty eight compounds representing 83.60% of the total oil, geraniol (15.18%), linalool (8.73%) and estragole (methyl chavicole; 8.09%) appeared as the main components. This essential oil also contained smaller percentages of sesquieterpenes caryophyllene oxide (6.17%), β-bourbonene (5.53%), β-cubebene (4.59%) and caryophyllene (4.17%). Oxygenated monoterpenes were major fraction with 43.07% of the total identified compounds. The chemical analysis of the essential oils of both savory cultivars indicates the similarity in the qualitative composition but also indicates a significant difference in the quantitative composition of these essential oils because the percentages (relative abundance) of the compounds identified in them were different.

Key words: *Satureja montana L., essential oil, GC-MS.*

ALLELIC COMPOSITION OF HMW-GLUTENIN PROTEIN AND THEIR RELATIONSHIP WITH QUALITY OF WHEAT

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Abstract

High molecular weight glutenin subunits (HMW-GS) proteins deposited in endosperm of wheat seed which have significant impact on bread quality. The HMW-GS encoded by genes located at the long arm of chromosomes 1A, 1B, 1D. The aim of this work was study allele polymorphysms at *Glu-A1*, *Glu-B1* and *Glu-D1* locus and loaf volume, grain protein content, sedimentation volume of eight wheat genotypes (G-3130, G-35183, G-3501, G3512, G-3574, G-3027, G-3075, G-3097) harvested in two years with various weather condition. For each genotypes, thirty single seed used for extraction of glutenin which separated by method of electrophoresis on SDS gel (11.8%). Electrophoregrams used for determining *Glu-1* alleles. Technological quality parameters analyzed by standard laboratory methods. The three alleles alleles (***a, b, c***) at the *Glu-A1*, three alleles (***b, c, d***) at the *Glu-B1* and 2 alleles (***a, d***) at the *Glu-D1* were identified. The highest protein sedimentation volume had wheat genotype G-3075 in the both years (54.0ml; 58.0ml) while the lowest sedimentation volume had G-3512 (34.0ml; 36.0ml). Grain protein content (GPC) was the highest in G-3075 in both years (14.20%; 15.40%) while the lowest GPC had G-3097 (11.60%) in first and G-3512 (12.60%) in the second year. Loaf volume was the highest in G-3075 in both year (520ml; 540ml) while the lowest was in G-3512 (400ml) in both years of experiment. The estimated quality traits varied depending on genotype and year. The better quality, in average, had the wheat genotypes which carried *Glu-D1d* allele.

Keywords: *Wheat, glutenin, Glu-1 allele, quality, polymorphism.*

EVALUATION OF MEDIUM EARLY PLUM CULTIVARS IN THE REGION OF BELGRADE (SERBIA)

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Abstract

Phenological traits, yield, and fruit characteristics of eight plum cultivars of medium early maturation time were studied in the region of Belgrade (Serbia) in the four-year period (2013-2016). Control cultivar for comparison was 'Čačanska lepotica'. The average time of flowering of tested cultivars was in the first half of April, and the average duration of flowering varied from 7.8 to 11.3 days. The average time of maturation ranged from July, 17 ('Valerija') to July, 31 ('Hanita'). The average yield per tree was the lowest in the cultivar 'Venera' (8.6 kg) and the highest in the cultivar 'Valerija' (28.6 kg). Compared to control, significantly higher yield was achieved in the cultivar 'Valerija', while the lower yield was found in cultivars 'Venera', 'Excalibur', 'Kišinjevska rana' and 'Čaradzejka'. The lowest vigor was recorded in the cultivar 'Valerija', and the highest in the cultivar 'Reeves'. The average fruit weight ranged from 36.1 g in the cultivar 'Hanita' to 71.1 g in the cultivar 'Reeves'. Compared to control, fruit weight was significantly higher in cultivars 'Reeves', 'Excalibur' and 'Valerija'. High soluble solids content (above 18%) was found in cultivars 'Venera' and 'Kišinjevska rana'. Based on the obtained results, for growing in Belgrade region, cultivars 'Valerija' and 'Hanita' can be recommended.

Keywords: *Prunus domestica*, *flowering*, *maturation*, *yield*, *fruit characteristics*.

USE OF BASIC RESEARCH IN PLANT ANATOMY FOR CROP IMPROVEMENT

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Abstract

Plant anatomy has usually been considered as a branch of basic sciences, which are not effective in translating their findings into agricultural research. This paper will present examples of research in crop anatomy and their contributions to crop improvement. Growth and development of cultivated plants depend on environmental factors, including abiotic and biotic stress factors, which can influence their yield to a large extent. Growth of plants depends on division, elongation and differentiation of cells, anatomical aspects, which are an integral part of plant reaction to environmental conditions. Specific micro-morphological and anatomical features of plants, including thickness of the cuticle on the leaf surface; abundance of different types of glandular and non-glandular trichomes; the number of stomata per leaf area, the amount of assimilation, storage or the lignified tissue; the number of vascular bundles; the diameter of the vessels etc., determine various processes within plants including water transport efficiency, tolerance to drought, lodging or pathogen attract, the size of the vegetative organs, fruits and seeds etc. Understanding the anatomical background of the mechanism of stress resistance of crop plants could be important for the optimization of cultivation practices and also could help in selection of new varieties. A quantitative trait locus analysis (QTL) using molecular markers allows a control of complex traits like yield to be dissected. Thus, anatomical traits provide valuable stepping stones between candidate genes and productivity traits controlling the yield itself. Therefore, anatomical research is a valuable tool in agricultural research in order to achieve higher productivity, especially in stress conditions, and should be integral part of breeding-based multidisciplinary research.

Key words: *Micro-morphology, microscopy, yield.*

THE IMPACT OF THE NATURAL SEED PURITY ON THE FINAL QUANTITY OF SEEDS OF RED CLOVER (*TRIFOLIUM PRATENSE* L.) AFTER PROCESSING

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Abstract

This paper presents an analysis of the impact of different natural red clover seeds purity on the quantity of seeds obtained in the processing center of the Institute for forage crops in Kruševac. The purity of eight different natural lots of red clover seeds ranged from to the lowest 75% to the highest 85%. The content of inert materials and weeds was different in different seed lots. The content of inert materials was from smallest 7.2% to the highest 21%. The highest weed content in natural red clover seeds was 12%. The purity of the red clover seeds after the processing ranged from at lowest 97% in the case of seed lot II to highest 99.7% in the seed of lot IV. Red clover (*Trifolium pratense* L.) per share in the production of fodder in Serbia is in second place, immediately after the alfalfa. Agrotechnical significance of red clover is very high. Red clover improving the physical characteristics of the soil, significantly increases the nitrogen content and the organic matter in the soil. For the establishment and use of red clover seeds for sowing must be clean, have high germination and genetic values. In the processing the quantities of red clover processed seeds directly depends on the content of impurities of organic and inorganic origin. It also depends on the quantity and type of weed seeds that are being processing. The aim of the study was to identify relevant parameters of red clover seed processing depending on the equipment. The relevant parameters for processing seeds of red clover are: content of pure seeds (%), weed seeds and the seeds of other cultures (%), the inert matter (%), the quantity of processed seeds (kg), the losses of seeds (%) and the processing output (%). Based on the obtained results, it is possible to make an optimal adjustment, and selection of the appropriate equipment for processing seeds of red clover, depending on the amount and type of impurities in natural seeds of red clover in the processing.

Keywords*: Seeds, processing, red clover, weed species, impurities.*

GRAIN YIELD VARIABILITY IN MID-EARLY MATURING MAIZE HYBRIDS

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Abstract

Field trials on mid-early maturing maize hybrids were established in 2010 and 2011 in the vicinity of Smederevo(40° 39' N and 20° 57' E, 99 ma.s.l.) in Serbia to analyse grain yield and its components at different plant densities under the existing agroenvironmental conditions. Twelve maize hybrids belonging to FAO maturity groups 500 and 600 (50:50) were sown in each year in two independent trials at 51,000 and62,000 plantsha^{-1}, respectively, each in a randomised block design with three replications. Wheat was the preceding crop in both years. During the growing season, standard agricultural practices (without irrigation) were used. Maize growing conditions in 2010 were more favourable than in 2011, including more moderate air temperatures during the growing season, a more uniform distribution of rainfall, and more rainy days. Total rainfall was much lower in 2011, especially during July and August, i.e. at critical growth stages (flowering and fertilisation) of the tested hybrids. Grain yield of all hybrids was higher in 2010, mostly due to the higher amount and more uniform distribution of rainfall during the growing season. In both years, significantly higher grain yields were obtained by FAO 600 hybrids than by FAO 500 hybrids. Grain yield in 2010 was significantly greater at ahigherplant density in FAO 500 hybrids, as opposed to later maturity hybrids which showed no significant differences in grain yield across plant densities. Regardless of differences between the tested groups of hybrids, the grain yields of all hybrids in 2011 were consistent across plant densities in that no hybrid produced significantly greater yields at ahigherplant density.Results show that increases in the number of plants per unit area under favourable growing conditions (with irrigation included) would give priority to early maturing hybrids over longer-season hybrids, with grain moisture content at harvest also taken into account.

Keywords: *Grain yield, hybrids, maize.*

AN ANALYSIS OF PLUM PRODUCTION IN SERBIA FROM 2005 TO 2016

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Abstract

According to the total number of trees and average annual production, the plum has had the leading position among fruit crops in the Republic of Serbia for many years. According to the data on the period from 2005 to 2014, the Republic of Serbia was the second in the world in the production of these fruit crops, right after China. Extremely favorable natural conditions for plum cultivation, among other things, have certainly contributed to the abundance of plums in the Republic of Serbia. However, one can notice that the productive area under this crop has not increased in the past couple of years, which is worrisome. This paper presents an analysis of plum production in the Republic of Serbia, using the index comparison method, i.e. using the statistical data on previous years, comparing them with the data on 2016. The data available on the website of the FAOSTAT statistical database and the Statistical Office of the Republic of Serbia (RZS) were used for the comparison and analysis. The analysis of the available data on the period from 2005 to 2015 showed that the total yield of plums in this period varied, as well as the yield per hectare in tons, ranging from 2.8 to 7.3, depending on the year. However, in 2016, one can notice a slight increase in the total plum production in comparison to 2014 and 2015, while 2013 is still a record year when it comes to yield. The data from these sources differed for certain years, but these deviations of the total yield can be attributed to variations conditioned by the very manner of yield counting, import and export.

Keywords: *Plum, production, analysis, yield.*

PHYTOL AND TOCOPHEROL CONTENT IN *PARROTIA PERSICA* LEAVES OBTAINED BY SUPERCRITICAL CO_2 EXTRACTION

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Abstract

Dephytylation of chlorophylls is one of the first steps in chlorophyll catabolism. Phytol after phosphorylation forms phytol diphosphate which can enter into the tocopherol biosynthesis. Tocopherol biosynthesis in leaves depends on phytol originating from chlorophyll, not on the phytyl-diphosphate from geranylgeranyl-diphosphate. Phytol and phytyl-phosphate accumulate in leaves. The phytol content in autumnal leaves of *Parrotia persica* was investigated. *Parrotia persica* autumnal leaves were extracted by supercritical fluid extraction. The extraction was done at the pressure of 30 MPa, at 40°C with the CO_2 flow rate 2.0 kg/h. The extraction time was four hours. Obtained extract was dissolved in two solvents, one part in hexane, the other in ethyl acetate. These two samples were analyzed by gas chromatography-mass spectrometry. In the sample dissolved in hexane the phytol content was 14.07 %. Tocopherol was not detected. In the sample dissolved in ethyl acetate phytol was present in 16.31 %. The tocopherol was detected in a quantity of 0.21 %. The higher phytol content in the sample dissolved in ethyl acetate can be attributed to the higher solubility in ethyl acetate than in hexane. The same explanation can be sought for tocopherol detection in ethyl acetate sample. Further experiments can reveal the faith of phytol after dephytylation of chlorophylls.

Keywords: *chlorophyll, Parrotia persica, CO_2 extraction.*

INFLUENCES OF FOLIAR FERTILIZERS AND GENOTYPE ON POLYPHENOL AND ANTIOXIDANT STATUS OF YELLOW SOYBEAN SEEDS

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Abstract

Polyphenols, compounds included in the composition of plants, are products of secondary metabolism and a significant component of the cell wall structure of plants. These bioactive compounds are synthesized by plants as self-defense under conditions of oxidative stress, and studies have shown that they can be attributed to a very strong antioxidant effect. Regular use of food rich in polyphenols in human nutrition improves the general condition of the body and reduces the risk of chronic diseases such as cancer, Alzheimer's disease, heart disease. Numerous studies have been carried out on soybean seeds different color layer, as a very important plant species that is used for human consumption and as animal feed. Antioxidant capacity of soybean can be improved by treating the plant material with nonstandard fertilizers based on plant extracts and trace elements. In this study, three varieties of yellow soy Nena, ZP015 and Laura were treated with nonstandard fertilizers during two growing seasons. Total phenols, after the extraction of the plant material (milled grain) were determined by the Folin Ciocalteu method, and results were expressed as mg GAE/g d.m. (milligram equivalent of Gallic acid per gram of dry matter). Depending on the genotype and treatment values vary from 9.62 to 15.74 mg GAE/g d.m. The antioxidant activity was determined by DPPH method and the results were expressed as μmol TROLOX eq/g of dry matter. Values vary from 192.58 to 245 μmol TROLOX eq/g d.m. The total reducing capacity was determined by the FRAP assay, the results were expressed as μmol $FeSO_4$ x 7 H_2O eq/g d.m. Values vary from 83.62 to 208.61 μmol $FeSO_4$ x 7 H_2O eq/g d.m.

Key words: *Polyphenols, soybean seeds, antioxidant capacity, foliar fertilizers.*

EFFECT OF DIRECT SELECTION ON PRODUCTIVE TRAITS OF VALERIAN (*VALERIANA OFFICINALIS* L.)

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Abstract

Effect of direct selection on root yields and on the essential oil content, are analyzed in the paper. As a source of variability we used selection material which consisted of the heterogeneous population of cultivated valerian. Using the method of direct selection (by vegetative multiplication), we created eight promising clones. Following traits were observed at the selected offspring: plant height (cm), yield of roots per plant (g) and essential oil content (%). During a two-year period of research, clones marked with numbers 97 and 156 have achieved reliably higher root yields. The values for essential oil content were different (0.457-0.825%). Values of variance and coefficients of variations for yield of roots, point out the existence of variability, which is an essential condition for the beginning of selection. The application of direct selection resulted in a high selection grain for yield of roots per plant and very low for essential oil content. The selection grain was greater at the selection intensity of 5% than of 10%.

Keywords*: Clones, direct selection, esential oil, yield of root, selection intensity, selection gain, valerian, variability.*

EFFECTS OF DIFFERENT TYPES OF CYTOPLASM ON THE KERNEL ROW NUMBER OF MAIZE INBRED LINES

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Abstract

The aim of the present study was to determine effects of both, different types of cytoplasm (*cms*-C, *cms*-S and fertile) and environmental factors on the kernel row number of 12 maize inbred lines. The trial with inbred lines was set up in two locations (Zemun and Krnješevci, Serbia) in 2013 and 2014. The trials were set up according to the three-replicate randomised complete block design within each type of cytoplasm. Each plot within the replicate encompassed four rows. Fertile versions of inbred lines were sown in two border rows and they were pollinators for their sterile counterparts. Statistic-biometric data processing was based on mean values per replicate and included the analysis of variance. The average kernel row number ranged from 10.3 (L_9) to 15.8 (L_5 and L_7). The variation of the kernel row number, related to the source of cytoplasm, was very significant. Differences ($Lsd_{0.01}$) in the kernel row number were not determined in inbred lines L_5, L_8, L_{10} and L_{12} in regard to the type of cytoplasm: *cms*-C, *cms*-S and fertile. The average kernel row number significantly ($P \leq 1\%$) varied in regard with the year of investigation. An average value (13.75) was higher in 2014 than in 2013 (13.31). The kernel row number per year varied very significantly ($Lsd_{0,01}$) but the differences were not significant in the inbreds L_2, L_3, L_8, L_9 and L_{12}. Gained results point out to effects of different types of cytoplasm on the kernel row number.

Keywords: *Cytoplasmic male sterility, inbred lines, kernel row number.*

VARIETY OF PHACELIA NS PRIORA: GOOD COVER AND HONEY CROPS

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Abstract

Phacelia is annual plant, native to the south western United States (Arizona and California) and northern Mexico, where it is used as a cover crop and as bee forage. Next to production of basic agricultural plants growers more and more as more cultivate alternative crops, like Phacelia, which become a good source of income and may enrich soil with organic matter as a green fertilizer or used for the production of biomass. Phacelia has been used as a seed production and forage crops, either on its own or in a mix with peas or vetch to provide forage and honey production, a source of high quality nectar and pollen, also has nematicidal properties. Blooms in the summer months with the blue - purple blooms which are attracting beneficial pollinators. The experiment was carried out in 2016, as planned divided plots in three replications, in the plots, of the Institute of Field and Vegetable Crops in Bački Petrovac (φN 45° 20' λE 19° 40' 89 msl), with variety NS Priora. NS Priora had flowering plant continues over 8 weeks and had high grain yield, good quality. Average germination energy of NS Priora seeds harvested in 2016 was 87% and the average thousand seeds weight was 1.40 g. Phacelia is presently very intensively used in organic agriculture and for sowing of arable land temporarily excluded from production which achieves high yields.

Keywords: *Phacelia, variety NS Priora, honey plant, seed quality, thousand seeds weight.*

BUCKWHEAT – *FAGOPYRUM ESCULENTUM* - HONEY AND MEDICINAL PLANT

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Abstract

Fagopyrum esculentum (Moench) compared to other cereals, buckwheat does not contain an allergen - gluten, which is highly regarded as a food for people with celiac disease. Buckwheat seed contains specific substances which are commonly used in the pharmaceutical industry and in traditional medicine. Above ground biomass of buckwheat contains rutin - the flavonoid glycoside, which is used in the pharmaceutical industry for the production of medicaments against high blood pressure, increased cholesterol levels and so on. In Russia and Poland buckwheat has an important role in traditional cooking same as in the USA, Canada and France where Crepes - pancakes made of buckwheat flour are very popular. Buckwheat flowers have pleasant aroma and attracts bees. On a green stem up to 2000 large, aromatic, white and pink flowers develop arranged in a cluster blossom, very rich in nectar. Buckwheat gives extended high quality nectar and successively flower 3-5 weeks. In 2013, according to FAO data, total world buckwheat production amounted to 2.55 million tonnes. Buckwheat is grown on a 2.38 million ha and had the average yield of 1 t ha^{-1}. The largest areas under buckwheat were in Europe (53%) and Asia (41%) and America (6%). In experiments that were conducted at the Institute of Field and Vegetable Crops, variety Novosadska had an average mass of plants of 28.22 g, plant height of 152 cm, the height of the first lateral branch 19.45 cm, stem thickness 6.78 mm, grain weight and flowers per plant of 6.13 g. Average grain yield of variety Novosadska amounted to 2.1 t ha^{-1}. Grain yields were significantly higher than the average world grain yield. Because of its extreme importance, it is desirable to have buckwheat as much in our fields. The profitable production of buckwheatwas realized with a variety Novosadska.

Keywords: *Buckwheat, honey and medicinal plant, variety, Novosadska, productive characteristics.*

LOSS OF BIRDSFOOT TREFOIL SEED DUE TO POD SHATTERING

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Abstract

Birdsfoot trefoil (*Lotus corniculatus* L.) is a perennial legume characterized by a high propensity of pod shattering and waste of seed during maturing. The aim of this study was to determine seed loss due to pod shattering until the moment of harvest in birdsfoot trefoil cultivars grown on acid soil (pH 4.8), as well as the possible impact of the soil liming (control - without CaO and treatment with 3 t ha^{-1} CaO) on the amount of seed loss. A field experiment was set up in 2012 in Čačak. The cultivars of birdsfoot trefoil K-37 and Rocco were planted at a row spacing of 20 cm and a seeding rate of 10 kg ha^{-1}. Analyses were carried out on the second growth in the second year of cultivation. The amount of seed loss due to pod shattering was determined by collecting of seed in the plastic containers placed between the rows of plants during pods maturation. The results indicated that the amount of seed loss due to pod shattering was 24.8% of the potential seed yield (calculated on the basis of yield components) in the cultivar K-37 and 15.4% in the cultivar Rocco. The liming did not have a significant impact on the amount of seed loss due to pod shattering in both cultivars. The results indicated that, in addition to the yield and quality of the harvested seed, important parameter in the choice of birdsfoot trefoil cultivars for seed production might be their tendency towards waste of seed.

Keywords: *Birdsfoot trefoil, liming, pod shattering, seed yield.*

THE EFFECT OF COVER CROPS ON THE CONTENT OF VITAMIN C IN GRAIN OF SWEET MAIZE

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Abstract

The investigation was conducted in the experimental field of the Maize Research Institute Zemun Polje, Serbia, during 2013/14-2014/15. The experiment was established as a block design with four replications. As winter cover crops-CC (factor A) the following plants were grown: CV–common vetch (*Vicia sativa* L.), FP-field pea (*Pisum sativum* L.), WO-winter oats, (*Avena sativa* L.), FK-fodder kale **(***Brassica oleracea* (L.) *convar. acephala*), two mixture variants of legume crops with oats (CV+WO and FP+WO) and two control treatments: a variant in which the surface was covered with dead organic mulch (DOM) and traditional variant(TV) in which, after ploughing in the fall, plot stayed uncovered during the winter. Green biomass of the cover crops was incorporated in the soil, immediately after cutting. A half of the elementary plot was infested with bio-fertilizer Uniker (BF), in an amount of 10 l ha^{-1} (factor B). The bio-fertilizer Uniker contains the strains of cellulolytic and proteolytic bacteria to support the mineralization of entered crop residues. The seeds of sweet maize ‘ZPSC 421*su* (FAO 400) were sown at the arrangement of 70 cm between rows and 22 cm between plants in the row (65,000 plants per ha). Preceding crop in both years was winter wheat. The content of vitamin C (L- and D – ascorbic acid) was determined by iodometric titration method. The data were processed by ANOVA. The investigated factors (CC and BF) and their interactions showed very significant effect on vitamin C content in both years. The greatest impact on vitamin C content was exhibited in variant of fodder kale but the lowest in variant with winter oats. The vitamin C content usually increased after all the leguminous cover crops compared with DOM and TV. Application of bio-fertilizer influenced positively content of vitamin C only in favourable meteorological conditions that were in 2015.

Key words: *Sweet maize, cover crops, content of vitamin C, bio-fertilizer.*

VARIATION OF BERRY ESSENTIAL OIL COMPOSITION IN COMMON JUNIPER FROM EASTERN SLOVAKIA

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Abstract

Common juniper (*Juniperus communis* L., Cupressaceae) is a dioecious coniferous shrub or tree. In Slovakia, it grows from lowland to montane level, mostly at pastures and forest edges on various types of bedrock. Ripe female berry-like cones (galbuli) are traditionally used in cuisine as a spice, and also for preparation of special alcoholic beverages. Essential oil obtained from mature galbuli is registered in the European Pharmacopoeia. It possesses antioxidant, antimicrobial, diuretic, stomachic, carminative, hypoglycemic, anti-inflammatory, and antirheumatic properties. Chemical composition of juniper oil varies in dependence on plant origin as well as galbuli ripeness, which is affected by environmental factors. Based on the amount of dominant terpene, several juniper chemotypes have so far been described. The aim of the present study was to evaluate accumulation of volatile secondary metabolites in mature berries of 9 individual plants from 2 sites of Eastern Slovakia region. Essential oil was obtained by hydrodistillation and analyzed by GC-MS. The yield of oils ranged from 0.4 to 1.7% (v/w). 27 compounds identified made in average 96% of total oil content. α-Pinene (present in amount of 18–43%) was the most abundant component of all essential oils, except one. A remarkable variability in composition of essential oil of juniper individuals was observed.

Keywords: *Juniperus communis, Common juniper, Essential oil, GC-MS.*

Acknowledgement

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EVALUATION OF ANTIOXIDANT PROPERTIES OF *SALVIA OFFICINALIS* L., *ROSMARINUS OFFICINALIS* L. FROM EASTERN SLOVAKIA AND FLORSALMIN

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Abstract

Oxygen is an essential component of our life, but imbalance in metabolism and production of reactive oxygen species (ROS) generate some disorders such as Alzheimer's disease, Parkinson's disease, aging and many other neural disorders. The high level or incorporation of free radicals to living system leads to processes of neurodegeneration. The antioxidant system of body plays important role in prevention of many diseases caused by the effect of radicals. The perspective therapeutic resource is a diet rich in natural antioxidants. Nowadays, research is focused on medicinal herbs as a commercial source of antioxidants. This study was conducted to evaluate the potential antioxidant properties of ethanol extracts *Salvia officinalis* L., *Rosmarinus officinalis* L. and commercial tincture from sage (Florsalmin®). The extracts were prepared from dried and fresh plant material. The antioxidant activity was measured spectrophotometrically by DPPH method. The results were expressed by the percentage of DPPH radical inhibition (%) and statistically evaluated. The results of the investigation indicated that *Rosmarinus officinalis* ethanol extract from fresh plant material showed the higher inhibitory capacity of DPPH radical. The inhibition value of DPPH by ethanol extract of *Rosmarinus officinalis* L. was 48.13% (in t = 0 minutes) and 67.46% (t = 35 minutes). Statistical significance in DPPH inhibition values was found in comparing fresh sage ethanol extracts and Florsalmin® at t = 10 and t = 15 ($p < 0.04$). By comparing dries sage and Florsalmin® statistical significance $p<0.008$ was found. We did not found a statistical significance between rosemary extracts and Florsalmin®.

Keywords: *DPPH, Free radicals, Neurodegenerative diseases, Fresh plant material, Dried plant material.*

Acknowledgement

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OPTIMIZE THE HYDROTHERMAL PROCESS OF PARBOILING OF HIGH AMYLOSE PADDY VARIETY (JAFFNA LOCAL - *ADDAKKARI*)

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Abstract

Parboiling is the hydrothermal treatment applied before milling in order to increase milling recovery by minimizing broken rice percentage at the end. Parboiling process has three stages, namely soaking, steaming, and drying. Soaking and steaming play a key role in quality of paddy grains by changing physical properties. Therefore, determination and product quality is important. Effect of soaking and steaming duration was investigated with respect to head rice yield in parboiling process. A paddy sample was given with different treatments of various degrees of soaking and steaming. Soaking and steaming conditions were kept constant for all treatments. Treatments were replicated three times. Analytical grade de-husking, milling and polishing machines were used to evaluate the head rice yield and broken rice yield percentages. Lab scale detectors were used to count whiteness value, which reflected the appearance of final processed product. Results obtained from the treatments, 72 hours of soaking with steaming for 3 hours duration, yielded higher de-husked head rice recovery and less percentage of broken rice of 85.3% and 14.7% respectively. The results revealed that 3 hours steaming duration produced very less whiteness value of 10.4. While soaking and steaming duration was increased the paddy samples also gave good recovery of head rice yield and whiteness values. There was no significant difference among the treatments in head rice yield and whiteness value in the highest level. Therefore concluded that parboiling process has to be optimizing the appropriate parameters of soaking and steaming method and duration is thus vital to end up with quality.

Key words: *Parboiling, soaking, steaming, milling, head rice yield (HRY), whiteness (Reflection).*

RESEARCHES ON GERMINATION PERFORMANCE ENHANCING TREATMENTS OF KENTUCKY BLUEGRASS (*Poa pratensis* L.) SEEDS

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Abstract

The study was carried out in 2016 at the laboratory of Ege University Seed Science and Technology Center (Turkey). The seeds of *Poa pratensis* L. cv. GEISHA were used in the trial. In order to improve the germination performance of these seeds, to provide a fast and homogenous emergence, to obtain good quality turfgrass, some germination improving pre-treatments were applied to the seeds. For this purpose, some preliminary experiments were carried out to determine the appropriate application dose, time and temperature. Hydropriming was chosen as the priming method. Hydropriming was applied to Poa seeds at two different times (48 h and 72 h) with control. As a result of the germination rate and speed tests made at the end of the applications, it was found that the 72 hour hydropriming application had a higher germination rate than the control and 48 hourapplication and the seeds germinated faster. In the second phase of the study, three different doses of KNO_3 were applied to the seeds after 72 hours of priming. As a result of these applications, it was found that priming application had a higher germination rate in terms of germination rate compared to control but there was no statistically significant effect on priming applications of KNO_3 applications after priming. In terms of average germination time, it was determined that KNO_3 applications after hydropriming caused germination in a shorter time than both control and hydropriming applications.

Keywords: *Kentucky bluegrass, hydropriming, KNO_3, germination rate.*

EFFECTS OF DIFFERENT PLANTING TIME AND PLANT DENSITIES ON SOME PARAMETERS OF SECOND CROP SESAME

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Abstract

This research was conducted in order to determine the effects of different planting time and plant densities on some parameters of second crop sesame at the GAP Agricultural Research Institute Talat Demirören Research Station in 2015 and 2016 in Şanlıurfa province (Turkey). Trial was conducted according to randomized blocks split plots experimental design with 3 replicates. The main parcels planting times were 1 June, 15 June, 1 July, sub-parcels 2 different inter-row spaces were 35 cm, 70 cm, and 4 sub-sub plots 4 different intra-row spaces were 5 cm, 10 cm, 15 cm and 20 cm. In the conclusion of the two-year findings we found that; seed and oil yield were statistically significant in terms of planting time. Though seed and oil yield were found statistically significant in terms of different inter-row distances, the effect on the number of seeds per capsule was found insignificant. Seed and oil yield were found statistically significant in terms of intra-row distances. According to the results obtained from the study, the highest oil yield was obtained from the 35x5 cm planting density on June 15 with 60.64 kg/da, the lowest seed yield was obtained from the 70x20 cm planting density on July 1 with 28.79 kg/da. Interaction between planting times x inter-rows x intra-rows was found significant statistically at the level of 1% in terms of seed and oil yield.

Keywords: *Sesame, planting time, plant density, seed yield, oil yield.*

SEED PROPERTIES OF HAWTHORN (CRATEAGUS SP.) SPECIES AND EFFECTS OF SULFURIC ACID PRETREATMENTS ON SEED COAT THICKNESS

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Abstract

The aim of the study was to determine of some seed properties and the effect of sulfuric acid pretreatments on the seed coat thickness of *Crataegus microphylla* (C. Koch.), *C. monogyna* (Jacq.), *C. orientalis* (Palas. Ex. Bieb.), *C. pontica* (C. Koch) and *C. pseudoheterophylla* (Pojark.)) seeds. For this purpose, seed weight, size, moisture contents and coat thickness of seeds were considered as seed properties. Ripe fruits of the species were collected from wild plants growing in Artvin province (Turkey) in October 2016. Identification of seed properties and experiments were performed in May 2017. The seed coat thicknesses were measured from the thinnest and thickest part of the seeds. The seeds were kept in sulfuric acid for 1 - 5 hours to determine scarification rates. The diameters and lengths of the seeds were also measured before and after the acid pretreatment. As a result of the study, it was determined that seed properties of *Crataegus* species varied significantly and of acid pretreatment durations affected seed coat thicknesses at different rates. The seed coat thickness of the thinnest part of seed changed between 0.82 (*C. orientalis*) and 1.63 mm (*C. pseudoheterophylla*). Species with the largest seed diameter were *C. pontica* and *C. pseudoheterophylla* (5.81 and 6.56 mm, respectively) and the species with smallest diameter was *C. orientalis* (3.48 mm). While the seed diameters pretreated with one hour sulfuric acid scarified by 4.68%, seed diameters pretreated with five hours sulfuric acid scarified by 10.04%.The most affected seeds by acid scarification belong to *C. orientalis* and the least affected seeds belong to *C. pontica*. It has been also determined that even though *C. orientalis* have the lowest seed weight (8.88 g) and the least seed size (3.47-6.36 mm) among the hawthorn species, it is one of the species which has highest (8.98%) moisture content.

Key words: *Hawthorn seeds, seed weight, seed size, moisture content, coat thickness, sulfuric acid, scarification rate.*

INVESTIGATION OF SOME YIELD AND QUALITY TRAITS IN LENTIL GENOTYPES

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Abstract

In the study, fifteen lentil genotypes and five lentil cultivarswere evaluated for yield, seed quality, adaptability and chalky spot syndrome in the Southeastern Anatolia of Turkey. Differences among genotypes for yield and yield components, protein content, seed rate with chalky spotted, and germination rate were significant. Seed yield ranged from 133.7 kg/da to 214.2 kg/da. Number of pods per plant ranged from 13.1 pods/plant in BM 848 to 25.58 pods/plant in FLIP2009-55L. Although BM 848 and BM 798 had a lot of flower, they had the minimum pods due to bacterial wilt caused plant lodging. Sakar variety had high yield, while local variety BM 848 had low seed yield. Genotypes ILL10975, FLIP2010-94L and Sakar were sensitive to cold. Differences among genotypes for protein content were significant and protein content varied from 26.37% in FLIP2009-50L to 28.76% in BM 848. Lentil crops with chalky spots were detected in Adiyaman location, and its rate ranged from 42% to 13%. Germination speed was significant in the seeds with chalky spotted. Although the germination rate in the seeds with chalky spotted was high at first, hypocotyl and epicotyl were weak and short, and fungi growth was intensively observed in petri dishes, also a lot of seeds could not germinate. Genotype × environment interaction was significant for seed yield, and different stability parameters were computed for genotype adaptability. Ecovalance (W^2i) and stability variance (σ^2i) were low in genotypes ILL 3375 and Kafkas, but Firat 87 had high values.

Keywords: *Lentil, lens culinaris, stability, chalky spot syndrome, seed quality.*

EFFECT OF HARVEST DATE ON TECHNOLOGICAL QUALITY OF SUGAR BEET (*BETA VULGARIS* L.)

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Abstract

This study, was conducted on the experimental fields of East Anatolia Agricultural Research Institute Experiment Station in Erzurum (Turkey) during 2013 and 2014 growing seasons to determine the effects of different harvesting date on yield and technologicalquality of some sugar beet cultivars under Erzurum ecological conditions. In the experiment, fifty sugar beet (*Beta vulgaris* L.) cultivars were evaluated under three harvesting dates (1st and 3rd week of October, 1st week of November). The experiment of field was designed with split plot in randomized complete block design with three replication. Root yield and some quality characters of sugar beet such as raw and refined sugar content, K, Na, alpha-amino nitrogen (ALAN) were measured for different harvesting time. The combined years showed that harvesting time was statistically significant for all the observed characteristics. And also, there were significant differences among cultivars for some evaluated characters and variety x harvesting date interactions were statistically significant ($P<0.01$). At the end of the two year study, the highest values of root yield (58.0 t ha^{-1}) and refined sugar yield (9.2 t ha^{-1}) were recorded in the second and third harvesting date falling into the same group as the statistical. The highest rate for raw sugar and refined sugar were obtained from third harvest date (1st week ofNovember) with 18% and 16% values, respectively.According to harvesting date for the highest Na (1.05 mmol/100g), K (5.59 mmol/100g) and alpha-amino nitrogen (0.41 mmol/100g) were obtained from first (1st week of October) harvesting date. The results indicate that 3rd week of October may be recommendable in harvesting date of sugar beets, together with 1st week ofNovember, under similar conditions in order to better root and refined sugar yields. And also the genetic variability had the major effect on yield and quality.

Keywords: *Sugar beet, technological quality, refined sugar, beet yield, polar sugar.*

RHIZOSPHERA ASSOCIATED SOIL BACTERIA EFFECIVE AGAINST *PSEUDOMONAS SYRINGAE* pv. *PHASEOLICOLA* IN *IN VITRO* CONDITIONS

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Abstract

Bean halo blight caused by *Pseudomonas savastanoi* pv. *phaseolicola* is an economically important disease of bean. *Pseudomonas savastanoi* pv. *phaseolicola* is a seed-borne pathogen. Bean (*Phaseolus vulgaris*), worldwide and remains difficult to control. Races of the pathogen cause either disease symptoms or a resistant hypersensitive response on a series of differentially reacting bean cultivars. Disease syptoms are typically water-soaked lesions that eventually develop a surrounding yellow halo produced by the release of the non-spesific toxin, phaseolotoxin. Some measure of control is achieved with copper formulations and streptomycin. Pathogen free seed and resistant cultivars are recommended. So, biological control of the disease by treatment with antagonistic bacteria may used. In this study, 120 bacterial strains were isolated from different rhizosphera associated soils from different bean grown fields in Adana, Antalya, Çanakkale, Konya and Mersin provinces in Turkey. Among these strains, 26 candidate bacterial strains were selected according to HR test on tobacco and dual culture methods. The candidate bacterial strains inoculated plates were incubated at 25 °C for 24 hours and 100 ml of the pathogen bacterial suspension (10^7cfu/ml) sprayed on the same plates. All plates were incubated at 25 °C for 24 hours. The diameter of clear zone around the candidate bacteria was measured as millimeters. All treatments were three times replicated. As a result of this study, 8 candidate strains have been found the most effective against *Pseudomonas savastanoi* pv. *phaseolicola* in *in vitro* conditions. Eight candidate bacterial strains inhibited growth of the pathogen with inhibition zone diameter ranging from 10.0 to 17.7 mm.

Keywords: *Bean, rhizosphera, candidate bacteria, inhibition zone.*

BIOLOGICAL CONTROL WITH CANDIDATE ANTAGONIST BACTERIA AGAINST BACTERIAL FRUIT BLOTCH

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Abstract

Bacterial fruit blotch which is caused by *Acidovorax citrulli* is a serious disease significantly reducing production of watermelon. Turkey first found in 1995 in Edirne province. The characteristic symptom of bacterial fruit blotch in watermelon is a dark, olive-green blotch on the upper surface of infected fruit. Stages of lesion development, the initial infection site may become necrotic. Cracks in the rind surface may occur, resulting in fruit rot. Rotting watermelon fruit often ooze a sticky, clear, amber substance or an effervescent exudate. Different strategies have been employed for cotrolling the disease such as host-plant resistance, cultural control and sanitary methods, chemical control and biological control. Since antibiotics are restricted in Turkey, investigation of alternative control strategiesis importanat. The aim of this study was to evaluate the effectiveness of rhizosphera associated soils bacteria against *Acidovorax citrulli in vitro*. Soil samples were collected from different watermelon grown fields in Adana, Edirne and Mersin provinces in Turkey between 2016-2017 years and candidate antagonist bacterial strains were isolated. These candidate antagonist bacterial strains were used against pathogen and measured inhibition zone in plates. As a result of this study, the most effective 6 candidate antagonist bacterial strains inhibited the grown of the pathogen with inhibition zone diameter ranging from 7.1 to 17.0 mm. Also 4 candidate antagonist bacterial strains were effective against *Acidovorax citrulli* with inhibition zone diameter ranging from 4.0 to 6.3 mm. This study indicated that antagonist bacteria showing potential for biological control was particularly important in the management of disease.

Keywords: *Watermelon, antagonist, biological control, inhibition zone.*

THE EFFECT OF WOOD CUTTING DIAMETER ON THE ROOTING AND SAPLING PERFORMANCE OF BLACK MULBERRY CUTTINGS

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Abstract

The study examined the effect of wood cutting thickness on rooting and sapling performance in black mulberry. The wood cuttings were taken in November, classified into three groups according to their diameter, immersed in a 5000 ppm IBA solution for five seconds, and then planted in a sub-heated perlite condition with three replicates. Rooting ratio, number of roots and root length were measured in cuttings which were kept in perlite for 90 days. Correlation between cutting diameter and cutting weight with rooting data was examined by regression analysis. Rooted cuttings were planted into 10 liter pots containing 1: 1: 1 ratio of peat: perlite: soil mixture after labeling cutting diameter, cutting weight, root number and root length of each rooted cutting as initial data. When vegetative growth was stopped, the effects of initial cutting diameter, cutting weight and root characteristics on the sapling quality expressed as plant diameter, weight and height, root length and number, shoot number, total leaf number were evaluated by multiple regression. In the study, while rooting rate in all cuttings was found to be 47.11%, the percentage of rooting was determined in thin (6-10 mm) cuttings as 28.18%, in middle thick (10-15 mm) cuttings as 63.70 and 100% in thick (15-20 mm) cuttings. Although the difference between rooting rates according to cutting thicknesses was found to be significant, no linear relationship was found between cutting diameter, cutting weight with rooting performance data. There were also low bilateral and multiple regression identified in relations between the initial data like cutting diameter, cutting weight, root number and root length of rooted cuttings with sapling quality expressed as plant diameter, weight and height, root length and number, shoot number, and total leaf number.

Keywords: *Black Mulberry, cutting, rooting, performance.*

AN INVESTIGATION OF PROTEIN CONTENT AND GRAIN COLOR IN F_5 DURUM WHEAT (*TRITICUM DURUM* DESF.) POPULATIONS

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Abstract

Wheat is one of the first cultivated plants in the World. Also it is a plant with strategic designation, energy and protein source. In Turkey on average 40% of the daily energy need is from wheat products it is met. This research was conducted to determine protein content, grain color, grain yield and SPAD, and evaluate these traits in plant selection by using F_5 durum wheat populations. Fifteen different hybrid combinations were used as material. This research was conducted with randomized complete block design with 3 replications during 2011-2012 growing season. The values ranged in hybrid between 69-7.51 (g/plant) in grain yield, 43.2-49.7 in SPAD, %14.8-15.9 in protein content, 41.18-45.66 in L value and 14.92-16.71 in b value. The hybrid of Spagetti x Levante took over in terms of grain yield, while the hybrid of Mersiniye x Levante had priority for SPAD, protein content, L value and b value. These combinations were found to have potential for new cultivar improvement via single plant selection. Positive and significant correlation was obtained between protein content and L according to correlation analysis. According to the results of the study, high yielding genotypes can be selected from some of F_5 hybrid combinations, but the selection of genotypes which have both high yield and quality is not likely. A combination of high quality and high yield genotypes can be obtained in early generations.

Keywords: *Durum wheat, hybrid combination, grain color, protein content, SPAD.*

DETECTION OF ASCOCHYTA BLIGHT CAUSED BY *ASCOCHYTA RABIEI* IN *CICER ISAURICUM* BY USING INTERNAL TRANSCRIBED SPACER SEQUENCES

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Abstract

Ascochyta blight, caused by *Ascochyta rabiei* (Pass.) Labr., (teleomorph, *Didymella rabiei* (Kov.) v. Arx) is one of the most important diseases reducing chickpea yield in Turkey (1). The disease may damage all parts of the plant. Oval or elongated fungal lesions are observed on leaflets, carrying brown dots. On green pods, lesions are circular to oval with distinctive pycnidia arranged in round circles. Often, infected seeds appear small and shriveled with brown lesions. In June 2014, these Ascochyta blight lesions were observed in *Cicer isauricum* P. H. DAVIS, one of the perennial wild relatives of chickpea in South Eastern Anatolia Region. The plants infecting fungus were collected and isolated on potato dextrose agar (PDA) plates for 7 days, and colonies with morphological characteristics typical of *A. rabiei* were single-spored and transferred to new PDA plates and incubated for 7 to 14 days. Fungal DNA was extracted using CTAB method (2). For molecular characterization, internal transcribed spacer (ITS) regions (ITS-1, 5.8S rDNA subunit, ITS-2) were amplified with PCR primers ITS 5 and ITS 4 (3). The sequences had ≥99% nucleotide identity with the corresponding sequence in GeneBank for *A. rabiei*. As a result, it can be said that it is the effective method for identification of the fungus in plants. Also, to our knowledge, this is the first report of Ascochyta blight of *C. isauricum* in Turkey.

Keywords: *Ascochyta blight, Cicer isauricum, fungus, internal transcribed spacer.*

THE EFFECT ON OLIVE OIL FATTY ACIDS COMPOSITION AND ANTIMICROBIAL PROPERTIES OF THYME OIL OBTAINED BY MACERATION AND DISTILLATION METHODS

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Abstract

In this research, the thyme plant which has been used for medical and aromatic purposes for centuries, effects of oils obtained by maceration and distillation of thyme oil on the composition of olive oil fatty acids and their antimicrobial properties were investigated. As a result of the study, it was found that olive oil fatty acids and their antimicrobial properties of thyme oil obtained by the maceration method did not cause any changes in the composition of the olive oil fatty acids and antimicrobial. Olive oil fatty acids, for example important fatty acids; oleic (18:1), linoleic (18:2) and linolenic (18:3) acids didn't change as statical. However, the addition of the thyme volatile oil obtained by distillation to the on olive oil resulted in three different molds (*Aspergillus parasiticus* NRRL 3357, *Aspergillus parasiticus* DSM 5771 and *Zygosaccharomyces rouxii* ATCC 28253) and 6 bacteria (*Escherichia coli* ATCC 25922, *Escherichia coli* O157: H7, *Listeria monocytogenes* ATCC 7644, *Salmonella entericasubsp.entericasero var. Enteritis* ATCC 13076, *Staphylococcus aureus* ATCC 2592) were tested for antimicrobial activity at different rations. As this research, olive oil and thyme volatile oil mixture show synergy effect as antimicrobial. But olive oil and thyme maceration oil mixture didn't show synergy effect as antimicrobial.

Key words: *Thyme, olive oil, volatile oil, fatty acids composition, antimicrobial*

EFFECT OF COLD STORAGE ON THE QUALITY OF *TRICHOGRAMMA PINTOI*

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Abstract

Egg parasitoids in the family Trichogrammatidae are among the most common natural enemies used in the world against many lepidopterous pests. Storage of natural enemies assure their availability in sufficient number at the time of release. A mass rearing system for *Trichogramma* spp. using host eggs killed before parasitization could improve current parasitoid production methods by making the system more efficient. For control of lepidopterous pests, the combined release of sterile insects and Trichogramma parasitoids would be a potential control strategy. A number of Trichogramma species have been tested by exposing the insects to cold storage conditions. It is important to test the amenability of each Trichogramma species to cold since not all of them are able to be cold-stored. Parasitism rates of *Trichogramma pintoi* Voegele reared on dead *Cadra cautella* Walker kept at -20 °C during 1, 2 and 3 hours were compared. The lowest parasitization rate was obtained in *Cadra cautella* eggs which had been kept at -20 °C for 3 hours. Parsitization rates were 63.52±4.86, 55.43±5.11 and 36.27±2.43. Subsequent trials focused on fitness of *Trichogramma pintoi* Voegele reared on killed embryos of *Cadra cautella* Walker. Percentage of parasitized eggs and longevity of females were quantified. Exposure of eggs to low temperatures in freezer reduced fecundity of females.

Key words: *Trichogramma pintoi, Cadra cautella, cold storage, parasitized eggs.*

EFFECT OF SOME MONOTERPENOIDS ON PARASITIZATION PERFORMANCE OF *TRICHOGRAMMA BRASSICAE*

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Abstract

Chemical pesticides have led in their reducing efforts to use due to their negative impact in environment, human health and the natural enemies. Especially in recent years, due to the potential dangers of synthetic additives in line with growing demand for natural compounds, these oils were investigated regarding toxic effects on agricultural pests and natural enemies. However, the impact on the natural enemies of these insecticidal compounds has not been fully understood yet. In this study, Cuminaldehyde, Eugenol and Allyl isothiocyanate were tested on the eggs of *Ephestia kuehniella*. After *Trichogramma brassicae* had interference with the egg, applications were done within 24 hours. The essential oil Cuminaldehyde 1 µL and 2,5 µL including one dose were applied on 2^{th}, 4^{th}, 6^{th} and 8^{th} days. The maximum output rate applied to the 8^{th} egg 1 µL, was calculated as 50,37±4,01 individuals. The lowest output of the application rate 4 daily 2.5 µL 27,66±3,18 units daily egg individuals have been identified. Applied at both doses was observed in the 2 daily eggs any output. In Eugenol two doses were applied again (50,100 µL) and the highest parasitisation rate was obtained as 64,90±6,9 after 8^{th} day 50 µL of parasitization. Allyl isothiocyanate compounds were previously death with another monoterpenoid when applied to the 0.1 and 0.3 µL doses of scrambled eggs no output has been observed.

Key words: *T. brassicae, monoterpenoid compouns, cuminaldehyde, eugenol.*

CONTROL OF POTATO VİRUSES ; THERMOTHERAPY AND CHEMOTHERAPY

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Abstract

Potato seed degenerates after several cycles of propagation because of the destructive viral diseases. Unlike other pathogens viral pathogens cannot be controlled by chemicals. Since potato is vegetatively propagated plant, viral infection increases through the coming years. Virus elimination methods such as thermotherapy and chemotherapy are commonly used to produce the nuclear stock of basic seed potato. Here, we report a method for PVS and PVY both (single and mixed infections) elimination by using the techniques mentioned above. Tubers of potato variety Agria and an advanced clone 6.2 were tested by direct antigene coating ELİSA. Antisera against Potato virus Y and potato virus S were used. Tubers with single and mixed positive reaction to PVY and PVY were treated for virus elimination. For the chemotherapy treatment, Ribavirin was used as antiviral agent. The explants, rooted young plantlets cultured on MS medium with and without Ribavirin, referring without Ribavirin medium as control and the other concentrations were 20 mg l-1, 35 and 50 mg l-1. Ribavirin suppressed survival and plant height, especially at higher concentrations cumulative effects were observed. DAS-ELİSA testing after chemotherapies revealed that chemotherapy was able to eliminate PVS and PVY %20 and %5, respectively. The best results were obtained from the third subculture. Although higher concentrations had cumulative effects and suppressed the survival, no significant difference was observed between the concentrations applied in terms of virus elimimation. The tubers of infected plantlets were subjected to thermotherapy (37 $C^0/30^0$, 16/8 hours) under %75 relative humidity conditions for 4,6, 8 and 10 weeks. No adverse effect was observed in the application of themotherapy. Thermotherapy at all levels resulted higher elimination rates for virus PVS comparing PVY. İt isconcluded that to improve the treatments for the elimination of potato viruses by considering the varietal responses and virus strains is essential.

Keywords: *ELISA, potato viruses, seed production, Solanum tuberosum, tissue culture.*

THE YIELD AND YIELD COMPONENTS OF SOME SILAGE CORN (*Zea mays* L.) VARIETIES AS THE SECOND CROP

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Abstract

The aim of this experiment was to assess yield and yield components of ten silage corn varieties (72 MAY 80, OSSK644, TK6063, OSSK596, TK 6060, HIDO, RX 9292, 71MAY69, SHEMALL AND OSSK 602) at the Agricultural Research and Extension Center, Igdır University from North East Turkey, in 2015. The experimental design was the completely randomized block with three replications on the soils of a clay silt loam. Results of experiments indicted that the yield and yield components of silage corn varieties as second growing were highly significant.It was reported that highest plant height (271.5 cm, OSSK 644), forage yields (99.47 t ha^{-1}, TK 6063), dry matter ratios (38.92%, HIDO), dry matter yields (31.49, 31.52 and 31.63,t ha^{-1}, TK 6063, HIDO, TK 6060 respectively), leaf ratios (24.92%, RX 9292), stem ratios (49.49%, HIDO), cob ratios (49.58%, TK 6063), leaf number (13.23 pieces, HIDO) and plant weights (1044.58 g, TK 6063) were found. It was concluded that TK 6063 corn variety seemed to be the best suitable for forage yield, dry matter yield, and cob ratio and plant weight between silage corn varieties in the region conditions.

Keywords: *Corn, varieties, yield, second crop.*

COMPOSITONS AND FEEDING VALUES OF SILAGE CORN (Zea mays L.) VARIETIES GROWN AS THE SECOND CROP

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Abstract

This investigation was carried out to determine the highest CP (Crude protein), NDF (Neutral Detergent Fiber), ADF (Acid Detergent Fiber), ADL (Acid Detergent Lignin), DMD (Dry matter digestibility), DE (Digestible energy), ME (Metabolizable energy), DMI (Dry matter intake), and RFV (Relative feed value) of silage corn varieties grown as the second crop under Igdır ecological conditions. Ten corn hybrids (72 MAY 80, OSSK644, TK 6063, OSSK 596, TK 6060, HIDO, RX 9292, 71 MAY 69, SHEMALL and OSSK 602) were used. The completely randomize block design were set up with three replications in the experiment areas of the Agricultural Faculty of the Igdır University in the 2015. According to results of the trial, the crude protein ratio (7.02-8.45%), NDF (40.24-54.16%), ADF (20.03-28.30%), ADL (1.76-2.93%), DMD (69.5-73.3 %), DE (3.13-3.40 Mcal/kg^{-1}), ME (2.66-2.79 Mcal/kg^{-1}), DMI (2.22-2.99 Mcal/kg^{-1}), RFV (115.0-170.0) were ranged. The results showed that crude protein ratios were not statistically significant between corn varieties. It was concluded that TK 6060 corn variety was found to be more nutritious than other corns, as it was suggested NDF, ADF and ADL values are low and DMD, DE, ME, DMI and RFV values are high in terms of animal feeding.

Keywords: *Silage corn varieties, crude protein, fiber, Lignin, dry matter digestibility, dry matter intake, relative feed value.*

THE YIELD AND SOME NUTRITIONAL COMPONENTS OF FOUR HAIRY VETCH (*VICIA VILLOSA ROTH L.*) VARIETIES

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Abstract

The goal of this investigation was to assess yield, agricultural and nutritional components of four winter hairy vetch varieties (Aday (Ceylan), Efes-79, Menemen-79 and Selçuklu-2002) at Agricultural Station of Hatay province and Ceylanpınar district of Turkey, in 2012. The experiment was arranged as completely randomized block design with four replications. Experiment results indicated that all traits of hairy vetch varieties were highly significant, except for winter hardiness and plant height in Ceylanpınar, and winter resistance and main stem height in Hatay location. Aday (Ceylan) with hairy vetch had the highest green herbage and dry matter yield in both agricultural stations of Hatay and Ceylanpınar. Furthermore, it was concluded that Aday seemed to be the most suitable from agricultural point of view, erect growing, high-yielding and winter-hardness, as well as a promising variety regarding nutrient content for animal nutrition.

Keywords: *Hairy vetch, varieties, yield, nutritional values.*

EFFECT OF VARIETY AND SOWING DENSITY ON SOME MICROELEMENTS CONTENT AND GRAIN YIELD OF CHICKPEA (*Cicer arietinum* L.)

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Abstract

The objective of this study was to determine the effects of cultivars in different sowing densities on microelements iron (Fe), nicel (Ni), zinc (Zn) and sodıum (Na) and grain yield of chickpea (*Cicer arietinum* L). Field experiment was performed in research farm at the University of Bingol (Turkey) in 2016. A complete blocks design in two varieties i.e. Arda and ILC-482 were in main plots, whereas five chickpea seeding density (20, 30, 40, 50 and 60 seed m^{-2}) were in sub plots. The results indicated that seeding densities significantly affected grain yield and Ni content while Fe, Ni and Zn were not affected significantly. Variety ILC-482 produced the maximum grain yield (86,26 kg/da) by 60 seed/m^{-2} and Arda gave the lowest grain yield (19,80 kg/da) by 30 seed m^{-2}. The highest Ni conten has been obtained from ILC482 variety (6.66 ppm) and the lowest Ni content has been obtained from Arda variety (6.20 ppm).

Keywords: *Chickpea, microelements, seeding density, variety.*

EFFECT OF DIFFERENT TEMPERATURES ON GERMINATION AND SEEDLING GROWTH OF COMMON VETCH (*VICIA SATIVA L.*)

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Abstract

This research was conducted to determine germination and seedling growth of Common Vetch (*Vicia sativa* L.) on six different temperatures (0 – 5 – 10 – 15 – 20 - 25°C). The characters studied in the investigation are mean germination time, germination rate, number of leaves, root length, seedling height, root fresh weight, root dry weight, seedling fresh weight, seedling dry weight. Three common vetch cultivars (Orakefe, Selçuk, Alper) were used as experimental material. The study was carried out at Namık Kemal University Agricultural Faculty Field Crops Department Seed Laboratory during 2016 - 2017 growing season. The experiment was set up in a growth chamber in the petri dishes as randomized split plot design with 4 replications. A seed was considered to be germinated when the radicle protruded 1mm and germinated seeds were counted for 7 days and root number, root length, seedling height, root fresh weight, root dry weight, seedling fresh weight, seedling dry weight measured on day 14.

Keywords: *Common Vetch, germination, seedling growth.*

EFFECT OF DIFFERENT TEMPERATURES ON GERMINATION AND SEEDLING GROWTH OF VETCHLING (*Lathyrus Sativus* L.)

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Abstract

This research was conducted to determine germination and seedling growth of Vetchling (*Lathyrus sativus* L.) on six different temperatures (0 – 5 – 10 – 15 – 20 - 25°C). The characters studied in the investigation are mean germination time, germination rate, number of leaves, root length, seedling height, root fresh weight, root dry weight, seedling fresh weight, seedling dry weight. Two vetchling cultivars (Gürbüz, Karadağ,) and one genotype were used as experimental material. The study was carried out at Namık Kemal University Agricultural Faculty Field Crops Department Seed Laboratory during 2016 - 2017 growing season. The experiment was set up in a growth chamber in the petri dishes as randomized split plot design with 4 replications. A seed was considered to be germinated when the radicle protruded 1mm and germinated seeds were counted for 7 days and root number, root length, seedling height, root fresh weight, root dry weight, seedling fresh weight, seedling dry weight measured on day 14.

Keywords: *Vetchling, germination, seedling growth.*

EFFECT OF DIFFERENT TEMPERATURES ON GERMINATION AND SEEDLING GROWTH OF HUNGARIAN VETCH (*VICIA PANNONICA* CRANTZ.)

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Abstract

This research was conducted to determine germination and seedling growth of Hungarian Vetch (*Vicia pannonica* Crantz.) on six different temperatures (0 – 5 – 10 – 15 – 20 – 25 °C). The characters studied in the investigation are mean germination time, germination rate, number of leaves, root length, seedling height, root fresh weight, root dry weight, seedling fresh weight, seedling dry weight. Three hungarian vetch cultivars (Sarıefe, Altınova 2002, Egebeyazı) were used as experimental material. The study was carried out at Namık Kemal University Agricultural Faculty Field Crops Department Seed Laboratory during 2016 - 2017 growing season. The experiment was set up in a growth chamber in the petri dishes as randomized split plot design with 4 replications. A seed was considered to be germinated when the radicle protruded 1mm and germinated seeds were counted for 7 days and root number, root length, seedling height, root fresh weight, root dry weight, seedling fresh weight, seedling dry weight measured on day 14.

Keywords: *Hungarian Vetch, germination, seedling growth*

EFFECT OF DIFFERENT TEMPERATURES ON GERMINATION AND SEEDLING GROWTH OF NARBON VETCH (*Vicia Narbonensis* L.)

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Abstract

This research was conducted to determine germination and seedling growth of Narbon Vetch (*Vicia narbonensis* L.) on six different temperatures (0 – 5 – 10 – 15 – 20 - 25 °C). The characters studied in the investigation are mean germination time, germination rate, number of leaves, root length, seedling height, root fresh weight, root dry weight, seedling fresh weight, seedling dry weight.Three narbon vetch cultivars (Dikili, Bozdağ, Özgen) were used as experimental material. The study was carried out at Namık Kemal University Agricultural Faculty Field Crops Department Seed Laboratory during 2016 - 2017 growing season. The experiment was set up in a growth chamber in the petri dishes as randomized split plot design with 4 replications. A seed was considered to be germinated when the radicle protruded 1mm and germinated seeds were counted for 7 days and root number, root length, seedling height, root fresh weight, root dry weight, seedling fresh weight, seedling dry weight measured on day 14.

Keywords: *Narbon Vetch, germination, seedling growth.*

AGRONOMIC PERFORMANCES AND NUTRITIONAL VALUES OF FOUR HAIRY VETCH SPECIES (*VİCİA VİLLOSA* ROTH L.) VARIETIES

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Abstract

The objective of this study was to compare performances of four winter vetch species (Aday (Ceylan, Efes-79, Menemen-79 and Selçuklu-2002) subjected to different location, of Agricultural Station of Hatay and Ceylanpınar of Turkey, in 2012. Seeds of four winter vetch species were sown in plots in the completely randomized block with four replications in both Ceylanpınar district and Hatay province. Results of experiments indicted that all characters of winter hairy vetch varieties except for winter resistance and plant length in Ceylanpınar and winter resistance and length of the main stem in Hatay location were highly significant. Aday (Ceylan) with winter hairy had the highest green herbage and dry matter yield in both agricultural stations of Hatay and Ceylanpınar. In conclusion, the present study showed that Aday (Ceylan) seemed was the best suitable from the agricultural point of view, because it was observed that it had erect growing, high-yielding, winter-resistant, earlier maturation than other varieties and regarding nutrient content for animal nutrition.

Keywords: *Hairy vetch, varieties, yield, nutritional values.*

INOCULATION TECNIQUES FOR ASSESSING PATHOGENICITY OF FUSARIUM SOLANI, F. OXYSPORUM, MACROPHOMINA PHASEOLINA AND RHIZOCTONIA SOLANI FROM PEPPER (CAPSICUM ANNUM) SEEDLINGS

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Abstract

In this study, surveys were carried out from June to September during 2015 to 2016 for root rot and wilt diseases caused by *Fusarium solani, Fusarium oxysporum, Macrophomina phaseolina* and *Rhizoctonia solani* in pepper fields in Şanlıurfa, Diyarbakır, Mardin and Adıyaman provinces of Turkey. Pathogenicity of some isolates of *F. solani, F.oxysporum, M. phaseolına* and *R. solani* on pepper seedlings were evaluated. Inoculated plants were left to grow for three months after transplanting under greenhouse conditions. Infested rice grain inoculum was used to test the pathogenicities of all four fungi. Suspansion method was used for *F. solani* and *F. oxysporum* while soil infestation with wheat bran method was used for *M. phaseolına* and *R. solani* inoculations. The tested isolates caused stem and root rot, chlorosis of leaves and stunting. Soil infestation method with rice grain inoculum was the most suitable method for testing pathogenicities of all tested fungi. Significant differences among pathogenicities of the tested isolates and control were noticed when different parameters were used for measuring virulence. Among tested fungi, *F. solani* induced the most severe foliar symptoms and caused the highest reduction in fresh plant and root weight when rice-grain inoculum was used. Whereas *R. solani* was the most virulent isolates causing most severe root symptoms and reducing dry plant and dry root weight by the same inoculation method. The results of the present study may have practical implication to screen pepper seedlings against those pathogens. In conclusion, we suggest rice-grain inoculation to test pathogenicities of *F. solanı, F. oxysporum, M. phaseolına* and *R. solanı* on various pepper cultivars.

Keywords*: Pathogenicity, Fusarium solani, F. oxysporum, Macrophomina phaseolina and Rhizoctonia solani, pepper.*

TESTING OF F_3, F_4 AND F_5 DURUM WHEAT SEGREGATION POPULATIONS FOR NITROGEN USE EFFICIENCY, PROTEIN CONTENT AND GRAIN YIELD

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Abstract

In this study, 15 different hybrid durum wheat combinations at the $F_{3,4,5}$ stage were evaluated in terms of grain yield, protein ratio and nitrogen utilization efficiency (NUE) under three different nitrogen conditions. The availability of SPAD meter as indirect selection criterion for all investigated traits was investigated. In this study, it was determined that SPAD meter could be used as an indirect selection criterion in durum wheat breeding to achieve the desired yield and quality results. In addition, genotypic differences were found to be higher in medium nitrogen conditions for grain yield, higher nitrogen doses for SPAD, and lover and medium nitrogen condition protein content and N use efficiency. Genetic correlations of GNY, protein and Spad with grain yield was high at F_3 generation and high nitrogen conditions. SPAD meter can be used as an indirect selection criterion in identifying high-yield genotypes in F_3 generation and high nitrogen conditions. It has been determined that all generations of Zenit x Menceki, Mersiniye x Menceki, Zenit x Mersiniye, Mersiniye x Spagetti ve Spagetti x Menceki crosses have high yield potential and stability. The evaluation of the segregation populations at different stages in the same year and selection in the later generations according to obtained results will make a significant contribution both in the breeding evaluation in one year, in reducing the cost and in increasing the success of the treatment.

Keywords: *Durum wheat, nitrogen use efficiency, protein content, SPAD.*

MORPHOLOGIC CHARACTERIZATION OF COMMON BEAN (*PHASEOLUS VULGARIS* L.) COLLECTED FROM DIFFERENT PROVINCES OF TURKEY

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Abstract

Genetic resources are very important for genetic and breeding studies. Therefore, it is of utmost importance to give brief information about the available diversity harbored by bean genetic resources and their use in development of new cultivars and in the alternative agriculture system. This study was carried out to determine control of the adaptability of 252 common bean landraces collected from 13 different provinces of Turkey including 4 commercial cultivars for agronomic traits under Eastern Black sea ecological conditions of Turkey in 2015. The experiment was laid out with augmented design at research and implementation area of Abant Izzet Baysal University, Bolu, Turkey. There was a high variation in common bean genotypes in terms of days to flowering (40 – 75 days), days to first pod setting (53 – 74 days), number of branches per plant (2 – 12), pod length (8 – 13), plant height (25 – 390 cm), significantly while no significant differences were seen among common bean genotypes in terms of number of pods per plant (7 – 73). This was initial point for genetic and breeding studies and we are conducting now genome wide association mapping for these agronomic traits for marker-assisted selection in Turkish common bean breeding program.

Keywords: *Phaseolus vulgaris* L., *agronomic traits, genetic resources.*

Acknowledgement

This study was financially supported by the Research and Development Unit (BAP) of Abant Izzet Baysal University (Project Number: 2015.10.07.868).

DETERMINATION OF THE RELATIONSHIP BETWEEN YIELD AND YIELD CHARACTERISTICS IN SOME GREEN LENTILS LINES/VARIETIES

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Abstract

This research was carried out in the two-year period, 2013-2014. It was aimed to determine the factors affecting yield and yield characteristics in lentil genotypes cultivated in the ecological conditions of Kirsehir province. In the study, 6 green lentil genotypes were used, 3 of which were green lentil cultivars. The study was conducted in a randomized blocks trial design with 3 replications. Plantings were carried out on 28 March 2013 and on 24 March 2014. According to the two-year average of the green lentil genotypes used in the research, plant length ranged from 15 to 38 cm, first pod height ranged from 12 to 26 cm, the number of pods per plant from 5 to 58, number of seeds per plant from 4 to 47, 1000-seed weight ranged from 24.44 to 49.88 g and yield from 78.2-86.1 kg da^{-1}. On the other hand, according to the results of the correlation analysis showed high positive relations between the first pod height and plant height (r=0.671**), and the number of pods per plant and number of seeds per plant (r=0.543**). According to the results of the path analysis, 1000-seed weight, the number of seeds and the number of flowering days expressed the indirect effects and the highest direct effect on the yield. As a result, it has been determined that the number of pods, 1000-seed weight and first pod height should be considered as selection criteria in future studies on green lentil breeding .

Key words: *Kirsehir, lentil, correlation, yield, genotype, seed.*

EFFECTS OF THE PICKING PEDICLE AT DIFFERENT STAGES ON TULIP GROWTH

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Abstract

Tulip is one of the bulbous plants that show up with the beautiful flowers in the landscape areas and gardens in the winter months. The bulbs of the tulip must have over certain circumference of the bulbs to be able to bloom. The circumference of the bulb affects the flowering positively. This research was carried out to determine the effects of pedicle picking at different stages on plant growth and bulb parameters between November 2015 and May 2016 in pot culture. The bulbs of *Tulipa gesneriana* L. "Golden Parade" with 9 cm circumference were used as a plant material. After the bulbs were treated with fungicide, they were planted on November 23, 2015 in plastic pot filled with a mixture of peat (50%) and perlit (50%). The research was designed according to randomized plot design with 3 replications and each plot (plastic pot) had 5 tulip bulbs. Three different treatments were applied to the pedicle of tulip. The pedicle was picked as soon as it was seen in first treatment (T1). In second one (T2), the pedicle of the tulip was picked under its receptacle before blooming. The pedicle was not plucked in the control application (C). Some parameters such as bulb diameter, bulblet number, bulblet diameter, leaf number, leaf width, leaf length and leaf width were measured. As a result of statistical analyses, treatments have a significant effect on bulb diameter but there were no significant differences between the treatments for the other parameters. The highest bulb diameter was found in T1 (31.46 mm) and T2 (30.87 mm). The bulblet number was determined between 1.17 and 1.50 piece.

Keywords: *Tulipa gesneriana L., picking pedicle, development of bulb, cultivation.*

HEAVY METALS INDUCED OXIDATIVE STRESS IN THE LEAVES OF *ZEA MAYS* L.

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Abstract

Heavy metals including cadmium (Cd), lead (Pb) and nickel (Ni) stimulate the formation of free radicals and reactive oxygen species leading to oxidative stress. This study was conducted to assess the heavy metal stress responses of *Zea mays* L. Seedlings grown in perlite culture at optimum conditions (at 25℃, 250 µmol $m^{-2}s^{-1}$ light intensity, 16 hour light/8 hour dark, % 40-50 humidity) for 14 days with half strength Hoagland solution were subjected to heavy metal stress conditions occurred by two different concentrations (25 and 100 ppm) of Cd, Pb and Nifor 13 days. The aim of this study was to evaluate the heavy metal toxicity in the leaves, to compare toxicity levels of heavy metals and antioxidative capacity of the leaves, to understand the deteriorative effects of heavy metals on cellular membranes and to find out the Cd, Pb and Ni tolerance levels of *Zea mays* L. Free radical scavenging capacities and relative leakage ratio of leaves increased by different heavy metal treatments, especially at higher concentrations. Likewise, superoxide dismutase and peroxidase activities of the leaves were increased with elevated levels of heavy metals toxicities. In conclusion, all heavy metal treatments lead oxidative stress in *Zea mays* L. leaves and leaves accumulated all heavy metals at toxic levels. Even though free radical scavenging capacity and antioxidant enzyme activities were raised, they could not prevent the leaves from destructive effects of heavy metals.

Keywords: *Zea mays L., Cadmium, Nickel, lead, oxidative stress.*

PHOTOSYNTHETIC DISORDER OCCURRED BY LEAD IN MAIZE

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Abstract

Soils contaminated with lead caused sharp decreases in crop productivity there by posing a serious problem for agriculture. Lead affects several metabolic activities in different cellcompartments. Plants exposed to lead show a reduction in photosyntheticrate which results in damaging chloroplast ultrastructure, decreasing synthesis of photosynthetic pigments and inhibiting electron transport. The aim of this study was to evaluate the lead accumulation in the leaves, to understand photosynthetic activity of leaves and the deteriorative effects of lead on photosynthetic pigments. In this study, photosynthetic performance and pigment contents and leaf lead content were measured after 13 days application of 50 ppm of lead in half strength Hoagland solution at optimum conditions (at 25℃, 250 µmol $m^{-2}s^{-1}$ light intensity, 16 hour light/8 hour dark, %40-50 humidity) in the controlled growth chamber. PSII photochemical activity of the leaves was obtained by chlorophyll *a* fluorescence measurements. Lead treatment resulted in chlorosis followed by necrosis from margin to center of leaves. Therefore, the chlorophyll pigments levels and photosynthetic capacity of the leaves decreased. Lead accumulation in the leaves lead abiotic stress determined by chlorosis and lower photosynthetic activity. These results showed that lead stress induced the photoinhibition of PSII and decreased the chlorophyll pigments content in maize leaves.

Keywords: *Zea mays L., Lead toxicity, photosynthetic activity.*

THE EFFECT OF DIFFERENT NATURAL FERTILIZATION TECHNIQUES ON SOIL CHARACTERSIN DRY FIG (*FICUS CARICA*L. SARILOP CV.) PRODUCTION

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Abstract

Turkey is ranked first regarding dry Fig production in the world. In terms of organic farming, Turkey is ranked second regarding dry Fig production after olive production. Main aim of the project was to determine impacts on soil characteristic parameters of 'Sarilop' dried fig variety applying different natural fertilization techniques on organic agriculture system. That research was carried out in a farmer orchard which consisted of Sarilop dried fig variety, located in Isafakilar village, Incirliova, Aydin in Turkey, in the period 2002-2005. This experiment was designed in completely randomized blocks with four replications and each replication was comprised of one tree. Totally six applications were applied: (control, vetch, natural vegetation, 20, 40 and 60 kg farmyard manure applications respectively). Soil samples were taken after harvest for three years. In this soil samples, soil texture, pH, $CaCO_3$ (%), total salt (%), organic matter (%), N, P, K, Ca, Mg analyses were done. According to analysis results, natural fertilization applications increased total salt and pH contents in the second year. Organic matter and N contents increased among the years. The highest organic matter was obtained by application of farmyard manure. P, K, Ca and Mg contents increased as parallel with increasing doses and reached the highest values by application of 40 kg farmyard manure.

Keywords: *Dried fig, organic fertilization, soil properties.*

THE QUALITY CHARACTERISTICS OF INDUSTRIAL TOMATO AND THE NUTRITIONAL STATUS OF THE LEAVES IN INDUSTRIAL TOMATO GROWN IN THE MEANDER BASIN

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Abstract

This research was carried out to investigate the nutritional status of industrial tomato in the lower basin of Great Meanderos. For this reason, soil, leaf and fruit samples were taken from 39 different areas where industrial tomato was grown. N, P, K, Ca, Mg, Fe, Zn, Mn, Cu and B in the leaf as well as width, length, weight, hardness, brix, pH and titratable acidity analyses in the fruit were done. The macro nutrients contents of the leaves were examined. While 76.92 % of total lands for N, 48.72% of total lands for P, and 56.41 % of total lands for K and Ca levels were found as low, Mg values were sufficient. When the contents of micro-elements of leaves were examined, in all samples, Fe contents were found at low levels. Mn levels of 61.54% of leaves were found as insufficient, but Cu, Zn and B elements were determined as sufficient. According to results of fruit morphological analysis, it was observed that fruits had the desired quality criteria for industrial tomato.

Keywords: *Industrial tomato, plant nutrient content, fruit quality.*

EFFECT OF PHOSPHORUS FERTILIZER AND SOIL BORON STATUS ON YIELD AND QUALITY OF SOYBEAN

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Abstract

Irrigation water is one of the main sources of high soil B levels resulting in toxicity. Thermal water containing high level boron; may be used as irrigation water. This study has been carried out based on previous experiment in which different levels of boron contained irrigation water on the cotton cultivation in 2011 and 2012 as the same coordinates were used. The aim of this study was to determine the effect of phosphorus fertilizer in different levels of boron contained soil conditions on yield and quality of soybean. The study was conducted as a split plot experimental design. The main plots were different level B contained soil (1.45, 3.26, 6.64 and 13.28 mg B kg^{-1}), sub plots were phosphorus applications (0 and 7 kg P_2O_5 da^{-1}). Soybean (*Glycine max* L. Umut 2002) cultivar was used. As the soil B level reach the toxic level, seed yield, plant height, 1000 seed weight, number of pods per plant and first pod height decreased. On the other hand, protein content of seed, leaf P and B contents increased under B toxic conditions. Phosphorus application resulted in increase in seed yield and plant height, while leaf B content resulted in decrease under B toxic conditions. Its effect on the other observed parameters were not important. In terms of decreasing plant B content in high/toxic level B contained soil, phosphorus applications were effective and may be used to increase the yield.

Keywords: *Glycine max, boron toxicity, phosphorus, seed yield.*

CORRELATION BETWEEN SESAME YIELD AND YIELD PARAMETERS

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Abstract

This research was carried out in order to determine the correlation (that resulted from the applications of different sowing time and plant densities) between yield and yield components of second crop sesame under semi-arid climate conditions at the GAP Agricultural Research Institute Talat Demirören Research Station in Şanlıurfa province in 2015-2016 growing seasons. The trial was carried out according to randomized blocks split split plots experimental design with 3 replications, In the trial, the main parcels were consisted of planting times (1 June, 15 June, 1 July), sub-parcels were divided into 2 different inter-row spaces (35 cm, 70 cm), and 4 sub-sub plots into 4 different intra-row spaces (5 cm, 10 cm, 15 cm, 20 cm). The parameters examined were: the number of capsules per plant, number of branches per plant, number of seeds per capsule, plant height, first capsule height, seed yield and thousand seed weight. According to the findings of combined correlation analysis of two year; positive and significant relationships were identified between the number of capsules per plant and number of branches per plant, number of seeds per capsule and plant height, first capsule height and plant height, thousand seed weight with plant height, number of branches per plant and number of seeds per capsule, seed yield with plant height and thousand seed weight respectively. Negative and significant relationships were identified between the number of capsules per plant and plant height, number of seeds per capsule and number of branches per plant, thousand seed weight with number of branches per plant and first capsule height, seed yield and number of capsules per plant. On the other hand, no correlation was found between seed yield and number of branches per plant, number of seeds per capsule and first capsule height.

Key words: *Sowing time, plant density, correlation, yield, yield Parameters.*

DETERMINATION OF THE REACTIONS OF SOME CHICKPEA (*CICER ARIETINUM* L.) GENOTYPES TO DIFFERENT ENVIRONMENTS

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Abstract

It is expected that genotypes respond differently in different environments. However, some varieties and genotypes are stable in diverse environments. These varieties and genotypes do not show much variation in terms of characteristics that affect yield and fertility. This three-year study was carried out in Kirsehir, Kirikkale and Yozgat, in the period 2014-2016. It aimed to determine the reactions of 10 different chickpea genotypes (Hasanbey, Aksu, Seckin, Damla 89, Gulumser, Cagatay, Sezenbey, Inci, Gokce, Uzunlu 99) in different environments. The experiments were conducted in a randomized block trial design with 4 replications. Different responses were carefully recorded, according to the cultivation sites. The genotype x environmental interactions in terms of yield of decare were found to be important at $P<0.05$. The yields of the genotypes ranged from 144.2 to 192.2 kg da^{-1}. Cagatay gave the highest yield at 191.2 kg da^{-1} in Kirikkale, while the Aksu genotype with 184.6 and 177.2 kg da^{-1} gave the highest yields in Yozgat and Kirsehir. In terms of low yields, there were changes across the regions. As a result, we can say that the Aksu genotype is more stable in terms of years and environment. On the other hand, we can say that the Gulumser genotype is the most variable one and has unstable characteristics.

Key words: *Chickpea, genotype x environment Interaction, genotype, yield, stability.*

WALNUT PRODUCTION OF TURKEY FROM PAST TO PRESENT

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Abstract

Turkey is one of the main walnut producer countries in the world. In 2015, Turkey ranked fourth in world production with 180,807 tons of production. It can be said that main part of walnut trees in Turkey have been grown without using of pesticides and chemical fertilizers, so that production shows organic qualifications. Continuous seed propagation in Turkey has given rise to a great number of seedling walnut trees, which represent valuable walnut gene resources. The number of native trees is estimated to be over 9 million and they possess large genetic variability in yield, nut and kernel characteristics, late bud breaking, late flowering, winter hardiness, tolerance to diseases. Thousands of walnut trees had been cut down in the eastern part of Turkey and sold abroad after the 1980's. After recognition of the importance of propagation by grafting and budding by growers in recent years, the orchards are being established with standard cultivars. These standard walnut orchards are generally established with Californian and French cultivars. The Ministry of Food, Agriculture and Livestock and The Ministry of Forestry and Water Affairs of Turkish Republic have important new policy on walnut development program in Turkey. The most important climate restrictions for walnut production are spring frosts in Turkey. Turkish walnut breeding program is abounding with cultivar breeding. There are no adequate studies on rootstock breeding. Harvesting cannot be made mechanically because native trees are large in size. Turkey's walnut production is expected to increase about 40,000 tons in the next 10 years with the initiation of production from newly established orchards.

Keywords: *Walnut production, import, marketing.*

DETERMINATION OF THE RELATIONSHIPS AMONG LEAF WATER POTENTIAL, LEAF RELATIVE WATER CONTENT AND VNIR SPECTRAL REFLECTION IN DWARF APPLE CULTIVARS

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Abstract

This study aimed to determine the relationships among leaf water potential, leaf relative water content, and spectral reflection values in dwarf apple cultivars 'Galaxy Gala' and'Top Red'. The study was carried out in the dwarf apple orchard located at Süleyman Demirel University in 2009. For this purpose, the leaf water potential, leaf relative water content and spectral reflection values were measured during the vegetation period. Under the field conditions, spectral reflections were measured at wave lengths of 350-1,050 nm by using the VNIR spectroradiometer with the plant probe. To create different water contents in the leaves, different amounts of irrigation water were applied to the plant root zone. The different rates of evaporation from Class A Pan (k_{cp1}: 1.25, k_{cp2}: 1.00, k_{cp3}: 0.75, k_{cp4}: 0.50, k_{cp5}: 0.25, and k_{cp6}: 0.00) were applied as irrigation water, thereby making the irrigation water amounts different. The spectral measurement values and the leaf relative water contentvalues were compared with the method of Stepwise Multiple Analysis. The highest accuracy coefficients ($0.98 \leq R^2 \leq 1$) were obtained in the estimation models formed by using the 4th wave length (band) at the end of the findings of the statistical analysis. A linear relationship at the level of R^2=0.85 was determined between the leaf water potential and the leaf relative water content.

Key words: *Apple, Galaxy Gala, top Red, VNIR, leaf water potential.*

THE EFFECT OF CUTTING ON GRAIN AND FORAGE YIELD OF TWO OATS SPECIES IN LOWLAND OF ALBANIA

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Abstract

The aims of this study were: a) to find the appropriate time of cutting for better grain and forage yield, and b) to determinate the most suitable species for dual use. The experiment was conducted during 2015 and 2016 at ATTC Fushë Krujë, according to the randomized completed block with four replications. In the study, there were species*: A. sativa* (cv. "Këmishtaj") and *A. byzantina* (cv. "Flavia"). Variants were: without cutting; a cutting when the plants were 30 cm height; two cuttings, the first when the plants were 30 cm and after renewal at the same height; a cutting when the plants were in the stem elongation stage. The following traits were determined: the number of plants before and after cutting, the height of plant, number of grains/panicle, grain weight/panicle, grain and forage yield. Cutting reduced the values of the studied traits. The most decrease of traits value was found in the variants with two cuttings and one cutting at intensive stem elongation. The number of plants decreased respectively by 5% and 10%, and the weight of grains/panicle at 34% in two variants for the specie *A. sativa*, 45% and 49,7% for the specie *A. byzantina*. Grain yield was higher in variant without cutting and species *Avena sativa* (58.6 kv/ha). The data showed that the better indices for dual use were taken in the variant with a cutting at 30 cm height, in both studied species.

Keywords: *Avena sativa, Avena byzantina species, forage, cutting, grain yield.*

CLIMATIC CONDITIONS, YIELDS AND PLANT PRODUCTION IN ALGERIA

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Abstract

The Algerian population is growing. We increasing passed from 23 million in 1987 to 40 million in 2016. This population growth induced a significant increase of the in food demand. Despite the fact that Algeria has abundant areas and favorable climatic conditions, the cultivable area is still representing only 3.5% of the total area of the country. Thus, the Algerian agricultural production is still far from covering meeting the local food demand of the population. That makes the country dependent of the international market, especially for sugar, oil and wheat. In the present work, the author intends to contribute to the understanding of the slow growth of the plant production in Algeria and its strong dependence on the climatic conditions and yields.Our analysis will be aimed to give a general review, and also to show the specificity of the three aggregates of the vegetation production: cereals (wheat, oat and barley), pulses (chickpea) and industrial crops and market gardening (industrial tomato, potato). In final, we will conclude by giving some recommendations to improve the efficiency of the public policies aiming to promote agriculture.

Key words: *Algeria, climate, yields and production, cereals, potato, chickpea, industrial tomato.*

MAINSTEM LEAF DEVELOPMENT IN SPRING BARLEY

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Abstract

Interval between appearance of successive leaves (phyllochron, PI) in grasses is determined by timing of leaf initiation at the stem apex and duration of leaf tip elongation through the whorl of mature sheaths. The objective of this study was to evaluate PI of main stem leave (MSL) development during tillering of six spring barley varieties, which differed in origin, earliness, spike type and some other traits. The studies were carried out in the field at the Institute of Field and Vegetable Crops Novi Sad, Serbia (45°20'N, 15°51'E, 86m asl) during 1999-2001 period. The experiments were arranged in a randomized complete block design with three replications and planting rate of 200 viable seeds per m^{-2}. Three random plants in each plot were labeled for monitoring during growing. PI was estimated every 2-3 days using Haun scale. Growing-degree-days (GDD) were used as time scale with base temperature of 0°C. PI was the reciprocal of the slope determined by regression of MSL against GDD using data from each plant within a cultivar. When plotted against thermal time leaf appearance was a strictly linear function of temperature. Across cultivars, the lowest PI was in 2000 – 81 GDD and the highest in 2001 – 89 GDD. Across years and leaves PI arranged from 65.5 in the variety Gustoe to 80.1 in the variety Jelen. All three factors, i.e., year, variety, and their interaction, were included in the PI determination of the first leaf. In all three years, first leaf demanded more days for appearance due to lower temperatures and shorter daylength. Of all six leaves studied, the second leaf was most strongly influenced by genetic constitution of cultivars and 75% of total variation belonged to this component of variation. Variation of PI of the third, fourth and fifth leaf was mainly determined by interaction GxY and year. It seems that in our investigation temperatures had a strong effect on leaf appearance. The linearity suggests that MSL stage can be used as a predictive measure of plant development and it can retroactively show the quality of the preemergent seedbed environment.

Keywords: *Spring barley (Hordeum vulgare* L.*), phyllochron, Haun scale, tillering, growing degree days.*

INHERITANCE OF PRODUCTIVITY IN F1 COTTON DIALLEL CROSSES (*GOSSYPIUM HIRSUTUM* L.)

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Abstract

The studies on genetic control of productivity are impotant for the breeding of new productive cotton varieties. Six varieties (*G. hirsutum* L.), differing in productivity were included in a half diallel cross, in 2010-2011, with the aim to investigate the inheritance of productivity. In 2012 another half diallel cross, including other six parents was made. The study was carried out in the experimental field of the Field Crops Institute in Chirpan. One set of F_1 hybrids and their parents were studied. The components of variability caused by the additive and dominant effects and their ratios, the variability due to the conditions of the environment were determined. Based on these, the indexes of inheritance of productivity were calculated. It was found that the productivity in the studied sets of crosses was controlled by a complex genetic system, in which the overdominance action of genes predominated especially in F_1–2011 and F_1-2012 without P_5. Statistically significant were both additive and dominant effects. Dominant gene action was superior to additive one for both diallel crosses and reflects the importance of dominant variance in the inheritance of productivity. The parents had different dominance (recessiveness) in F_1 – 2010-2011 during the two years of the exploration probably due to their specific reaction to the year conditions. Because of high degree of dominance, weakly genetic variability and different expression of genes observed in F_1 – 2010-2011 quick and successful selection can not be expected.

Keywords: *Cotton, G. hirsutum L., diallel analysis, productivity.*

STUDY ON RESISTANCE TO ABIOTIC AND BIOTIC STRESS FACTORS IN INTRODUCED SWEET CHERRY CULTIVARS FROM KYUSTENDIL REGION OF BULGARIA

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Abstract

Response of 16 new introduced sweet cherry cultivars and one hybrid from Poland and China to winter hardiness and late spring frost was evaluated, and their phytosanitary status was determined. The research was conducted in the experimental sweet cherry orchard planted in the spring of 2012 at the Institute of Agriculture – Kyustendil. The study on the resistance of cultivars to low winter temperatures was conducted under natural conditions in 2016 and 2017, and in 2016 for the late spring frosts. Young leaf or petal samples were taken from 84 trees and were analysed by ELISA for the presence of PNRSV (*Prunus necrotic ring spot virus*), PDV (*Prune dwarf virus*), CLRV (*Cherry leaf roll virus*) and RpRSV (*Raspberry ring spot virus*), PPV (*Plum pox virus*) and ACLSV (*Apple chlorotic leaf spot virus*) infection. In 2016 (-19.9°C), all investigated cultivars had a higher resistance to winter cold than the standard Van. In 2017 (-29.5ºC) with the highest cold resistance was cultivar Kozerska, in which the damage of flower buds was 79.2%. It was found that 13 of studied cultivars had higher cold hardness than Van. Young fruit sets were damaged completely without cultivar difference after the late spring frost on 27th April, 2016 (- 4,0°C). The most significant damages with deep longitudinal cracks on the stem of the trees were found in cultivars Kristin, Van, Van Compact, Rucsandra, Techlovan, Tieton, Huldra and Bigalise pozna. The total infection rate in the investigated orchard was 52.4%. Among the viruses, PDV infection was the most frequent (29.8%), followed by mixed infection - PNRSV + PDV (11.9%), PNRSV (5.9%) and ACLSV (4.8%). The different cultivars were infected to a different degree. PPV, CLRV and RpRSV were not present in the sweet cherry orchard.

Keywords: *Sweet cherry, winter hardiness, late spring frost, resistance, viruses.*

EVALUATION OF SPRING FROST TOLERANCE AND VIRUS STATUS OF SOME APPLE CULTIVARS AND HYBRIDS IN BULGARIA

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Abstract

The aim of the present study was to evaluate 15 new introduced apple cultivars and 5 hybrids to spring frost tolerance and the occurrence of main pome fruit viruses. The research was conducted in two experimental apple orchards planted in the spring of 2002 and 2007 at the Institute of Agriculture – Kyustendil, Bulgaria. The study on the tolerance to late spring frosts was conducted under natural conditions in 2016. On 27th April, it was registered an absolute minimum temperature of -4.0°C, with long duration of the impact (5.0 h). The best resistance to late spring frost showed young fruit sets of hybrid 1/5 and cultivars Fuji Nagafu 6, Oregon Spur, Teser T219, Super Chief, Scarlet Spur. There were no symptoms caused by spring frost on their fruits. The cultivars Ginger Gold, Arkcharm and the standard Prima were the most susceptible, in which the damages were about 90.0%. All samples were tested by DAS - ELISA for the presence of Apple mosaic virus (ApMV) and by Cocktail – ELISA for Apple chlorotic leaf spot virus (ACLSV) and Apple stem grooving virus (ASGV). Of the total 104 tested trees, 67.3% were infected with ACLSV and 3.8% with ASGV. A mixed infection by both ACLSV and ASGV was identified in 3.8% of tested trees. ApMV was not detected in investigated cultivars and hybrids.

Keywords: *Apple, cultivar, late spring frost, resistance, virus status.*

COMPARATIVE INVESTIGATION OF THREE CHERRY CULTIVARS WITH DIFFERENT STEM HEIGHTS

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Abstract

A comparative investigation of the growth and reproductive parameters of trees of the cherry cultivars: Kozerska, Stella, and Stefania with five different cutting heights of the stem and summer pruning was conducted during the period 2008–2014 in the experimental field of the Institute of Agriculture – Kyustendil, Bulgaria. The cultivars were grafted on mahaleb rootstock and planted at a spacing of 5 x 5 m. The growth of the trees of all cultivars was most vigorous at heights of the stems of 70 and 110 cm. The application of summer pruning led to suppression of the growth, which was with the lowest value among the treatments tested. During the period of full fruit-bearing, the highest fruit yields and largest fruits were obtained in the treatments with trees whose stems were shortened at 70 and 110 cm above the soil surface. Summer pruning and cutting of the stems at 25 cm above the soil surface retarded the transition of the trees into full fruit-bearing. Cultivar Stella shortened to 70 cm had the best economic performance (1,534 euro/ha), followed by Stefania at 110 cm (1,498 euro/ha); the lowest values of this parameter were observed in Kozerska at a stem height of 70 cm and summer pruning applied (264 euro/ha). Stella and Stefania had better growth and economic properties than Kozerska.

Keywords: *Cherry, cultivar, growth, yield, height of the stem.*

EFFECTIVENESS OF TWO TYPES OF CROWN PRUNING OF SOUR CHERRY CULTIVAR ERDI BÖTERMÖ

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Abstract

The influence of two types of pruning, a voluminous crown with different numbers of skeletal branches (5–6 and 15–18), of trees of the sour cherry cultivar Erdi Bötermö on the growth characteristics, chemical composition of the fruits and leaves, and the economic performance was examined. The investigations were carried out during the period 2006–2015 in the experimental field of the Institute of Agriculture – Kyustendil, Bulgaria. The orchard was established with sour cherry trees grafted on mahaleb rootstock and planted at distances of 5 x 4 m (500 trees/ha). The free-growing crown with 15–18 branches induced a better growth than that in the trees with 5–6 branches. The trees with 5–6 branches entered earlier the period of full fruit-bearing and had higher yields compared to those of the trees with 15–18 branches. The latter trees were more vigorous, and their yield and average fruit weight were greater. The number of skeletal branches exerted no effect on the content of dry matter, sugars, and acids in the fruits and leaf chemical composition. The resulting balance value amounted to 2,430 €/ha. The economic evaluation confirmed that a crown with 5–6 skeletal branches provided higher economic returns.

Keywords: *Cherry, forming a crown, economic impact.*

EVALUATION OF DROUGHT TOLERANCE IN NEW COTTON CULTIVARS USING STRESS TOLERANCE INDICES

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Abstract

Drought is a wide-spread problem seriously influencing production and quality of cotton (*Gossypium hirsutum* L.), but development of resistant cultivars is hampered by the lack of effective selection criteria. The objective of this study was to evaluate the ability of several selection indices to identify drought tolerant cultivars under different environmental conditions. Thirteen cotton cultivars were evaluated under both moisture stress (2016) and non-stress (2013) field environments using a randomized complete block design for each environment. Six drought tolerance indices including stress susceptibility index (SSI), stress tolerance index (STI), tolerance index (TOL), mean productivity (MP), geometric mean productivity (GMP) and mean harmonic productivity (HMP) were used. The significant and positive correlation of yield of genotype under non-stress condition (Yp) and MP, GMP and STI showed that these indices were more effective in identifying high yielding cultivars under different moisture conditions. The results of calculated gain from indirect selection in moisture stress environment would improve yield better than selection from non moisture stress environment. Coton breeders should, therefore, take into account the stress severity of the environment in choosing an index. The varieties Viki and Avangard-264 had the highest yields under non-stress conditions. Vega and Chirpan-539 varieties had a low yield potential and showed a high stress tolerance to drought.

Keywords: *Cotton, drought tolerance index, moisture stress.*

BRIEF POMOLOGICAL DESCRIPTION OF PERSPECTIVE SWEET CHERRY ELITES (*PRUNUS AVIUM L.)*

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Abstract

It was performed a brief pomological description of sweet cherry elites № 32/25 (Van x Stela), № 5750 (Kordia x self-pollination), № 3419 (4C–1821 x self-pollination), № 5752 (Kordia x self-pollination), № 1890 (Germersdorf x self-pollination) and № 6374 (Stella x Germersdorf), created at Institute of agriculture - Kyustendil. It was found that all elites, except for № 1890, have later flowering compared to the standard Van. According to the duration of ripening, the studied elites belong to the following 2 groups: middle medium ripening (the second decade of June) - elites № 5752, № 6374, № 3419, № 1890, № 32/25 and late ripening (early July) - elite № 5750. The biometric analysis showed that all sweet cherry elites have large fruits. In the different elites the form of fruit is cordate to wide-cordate, with dark red to black color of the skin. The flavor of all elites is sweet-sour with the exception of elite № 3419 which taste is defined as a sour-sweet. The coloring of the fruit juice is pink in standard Van and elite № 1890 to ruby-red in elite № 5752. The results of the annually conducted tastings show that the researched sweet cherry elites in the region of Kyustendil have high taste qualities.

Key words: *Sweet cherry, elites, pomological description.*

RESPONSE OF DURUM WHEAT TO NITROGEN FERTILIZATION RATES

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Abstract

The response of new Bulgarian durum wheat variety Predel to nitrogen fertilization was studied in a field fertilizing experiment with cotton – durum wheat crop rotation for the period 2008 – 2014, at the Institute of Field Crops – Chirpan, Bulgaria under rainy conditions. The studied nitrogen rates were 0; 60; 120 and 180 kg $N.ha^{-1}$. The experimental design consisted of randomized block design with four replications. A tendency was found that nitrogen fertilization increased grain yield. The nitrogen rates N_{120} and N_{180} proved increased grain protein yield with 49.6 and 48.7 % compared to the control. The rate N_{180} decreased the harvest index. The highest agronomic efficiency of nitrogen for grain and grain protein were obtained with moderate rate N_{120} average for the period. Nitrogen fertilization decreased partially the factor of nitrogen productivity from 68 $kg.kg^{-1}$ at rate N_{60} to 25 $kg.kg^{-1}$ at rate N_{180}. The highest concentration of grain protein - 15.97 % and vitreousness of the grain - 75.84 were obtained after applying N_{180}. The content of wet and dry gluten slightly depended on nitrogen fertilization. A strong positive correlation was established between nitrogen fertilization and grain+straw yield (r=0.726**), grain protein concentration (r=0.862**), grain protein yield (r=0.635**) and vitreousness of the wheat grain (r=0.856**).

Keywords: *Nitrogen rates, Durum wheat, grain quality, efficiency.*

BREEDING FOR LOW-INPUT RICE VARIETIES IN EGYPT.

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Abstract

Two field experiments on rice crop *(Oryza sativa, L.)* were conducted during two rice growing seasons, 2011 and 2012 at the Experimental Farm of Rice Research and Training Center (RRTC); Sakha, Kafr El-Sheikh Egypt to study the performance of some Egyptian rice (Seven rice cultivars namely; Sakha 102, Sakha 105, Sakha 106, Giza 177, Giza 178, Giza 179 and Giza 182 together with Egyptian Hybrid 1); which grown under low fertilizers levels of nitrogen and zinc fertilizers as a first step to breed for low input rice cultivar. The results revealed that increasing both nitrogen and zinc fertilization caused significant increase in the mean values of most studied characters. In connection, decreasing such fertilizers to 50% of the recommended rates of both nitrogen and zinc fertilizers did not affect the mean values of some tested cultivars of most studied characters, for Sakha 106 followed by Giza 179 and Sakha 102. Consequently one of these could be utilized as low input cultivar in respect of nitrogen and zinc fertilize

Key words: *Rice (Oryza sativa, L),nitrogen and zinc fertilizers, growth, yield and its components, cooking and eating quality.*

RESPONSE OF WHEAT GROWTH ANALYSIS AND NITROGEN USE EFFICIENCY TO NITROGEN LEVELS AND SEEDING RATES

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Abstract

Two field experiments were carried out during 2014/2015 and 2015/2016 seasons at Agricultural and Experimental Research Station at Giza, Faculty of Agriculture, Cairo University, Egypt to study the influence of three nitrogen levels (75, 100 and 125 kg N/fad.), one faddan = 4200m^2, three seeding rates (200, 300 and 400 grains/m^2) on growth of three wheat cultivars (Sakha-94, Gemmiza-9 and Giza-168). Flag leaf area in both seasons, absolute growth rate (AGR), leaf area index (LAI) at 80 and 100 days in the second season, net assimilation rate (NAR) increased significantly with increasing N levels up to 125 kg N/fad. Nitrogen use efficiency (NUE) significantly decreased with increasing N levels. Seeding rates significantly affected LAI and AGR at 80 in the first season as well as AGR at 80 and 100 days in both seasons. The highest values for the previous traits were produced with seeding 300 or 400 grains/m2. Seeding rates did not affect NAR and NUE. All studied traits except AGR at 80 days in the second season, NAR at 80 days in the first one and NUE in both seasons were significantly affected by cultivars. All interactions had significant effect on some studied traits either in one season or in both seasons. Some interactions had significant effect on NAR. Moreover, none of the tested interactions affected NUE significantly. The overall findings indicated that seeding Gemmiza-9 or Giza-168 with 300 or 400 grains/m^2 and application of 125 kg N/fad. could be more beneficial in the study area.

Key words: *Wheat, N levels, seeding rates, cultivars.*

EFFECT OF FOLIAR APPLICATION WITH BIO AND ORGANIC FERTILIZERS, BORON AND ZINC ON PRODUCTIVITY AND FRUIT QUALITY OF GOLDEN DELICIOUS APPLE FRUITS

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Abstract

The Golden Apples are among the most important apple cultivar in most cultivars because it acceptance and approval of the farmers as well as to a good quality apples in Syria, given the desire of the local market and global. PPFM spraying significantly increased productivity and quality. PPFM Ping Pigmented Facultative Methylotrophic Bacteria follow the bacteria for Gram Negative Methylotrophic. The benefits of using humic compounds, including humic acid - especially in soils with low organic content are to increase mineral uptake, increase the plant's ability to withstand high temperatures and dryness. Therefore, the importance of research is to verify the possibility of increasing the production of apples through the application of spray treatments of two elements of the microelements are boron and zinc and some organic and organic fertilizers. This study was conducted during 2015 and 2016 seasons within the research station Barshine Hama, above the sea level, the trees of Golden delicious Apple cultivar on full fruiting stage,16 years old and budded on seed rootstock (Malus domestica), in order to study the effect of foliar spray of bacteria PPFM, amino acid, humic acid, boron, and zinc, etch one alone in productivity and some apple quality parameters, the results have been shown a scientific rise in apple productivity on trees were spread with bacteria PPFM and boron compare with the rest of treatments, and this increase also coincided with a significant increase in total soluble solids, but without a significant change in firmness compared with rest of the treatments.

Keywords*:* *Apple, Bacteria PPFM, Boron, Zinc, Amino acid.*

EVALUATION OF SOME WHEAT GENOTYPES UNDER SOWING DATES AND NITROGEN LEVELS: 1. GROWTH AND STRAW YIELD

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Abstract

A study on the response of five wheat genotypes (Sids 1 and Gemmiza 9 from Egypt, L.R.-52 from Sudan, L.R.-62 and L.R.-67 from Yemen) to three sowing dates (25th November, 10th and 25th December) and two nitrogen levels (120 and 240 kg N/ha.) was conducted at the Agricultural Experimental and Research Station, Faculty of Agriculture, Cairo University, Egypt during 2011/2012 and 2012/2013. The experiment was laid out in RCBD in a split plot design, placing sowing dates in the main plots, nitrogen levels in the sub plots and genotypes in the sub sub-plots with three replications. Sowing dates had significant effect on the number of days to 50% heading, flag leaf area, plant height and straw yield in both seasons. The highest values of the previous traits were obtained at early sowing on 25th November in both seasons. All the studied traits significantly increased by increasing nitrogen levels up to 240 kg N/ha. The genotype L.R.-67 emerged 50% of its heads earlier, Gemmiza 9 and L.R.-67 gave taller plants, L.R.-62 produced the highest number of tillers, whereas Gemmiza 9 and L.R.-62 produced the highest straw yield in both seasons. The earliest heading and the largest flag leaf area were obtained from sowing on 25th December at 240 kg N/ha. in both seasons. Late sowing (December) and low nitrogen applications significantly declined the yielding capacity of the wheat genotypes. Gemmiza 9 and L.R-62 performed better in term of straw yield as compared to the other genotypes.

Key words: *Wheat, sowing dates, N levels, genotypes*.

EFFECT OF SOME MICROELEMENTS AND GROWTH SUBSTANCES ON YIELD, YIELD COMPONENTS AND CHEMICAL COMPOSITION TRAITS IN SOME FABA BEAN CULTIVARS

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Abstract

The present study was carried out at Itay EL-Baroud Agriculture Research Station farm, EL-Behaira governorate, Egypt during the two agriculture seasons of 2012/13 and 2013/ 14. Three faba bean varieties Nubaria 1, Giza 716 and Sakha 1 were used in the present study to examine seed yield, its components and chemical composition under four commercial growth substances with control. In the first season of 2012/13, the three faba bean cultivars were sown and evaluated in experiment designed in a split plot design with three replications. The result indicates that, the cultivar Nubaria 1 expressed the best desirable mean values for number of branches/plant, 100- seed weight, seed yield /plant, seed yield. in both seasons and number of pods/plant, number of seeds/plant in 2012/13, carotain content, chlorophyll B and protein percentage in both seasons. The growth substance Crop plus showed the most desirable effect on plant height, number of pods/plant, number of seeds/pod, number of seeds/plant, 100- seed weight, seed yield/plant and seed yield in both seasons, carotain content, chlorophyll A, chlorophyll B, protein percentage and carbohydrate percentage in both seasons.

Keywords: *Microelements, yield, traits, Faba beans.*

THE EFFECT OF NUTRIENT SOLUTION COMPOSITION ON DEVELOPMENT OF *CICHORIUM SPINOSUM* PLANTS

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Abstract

In the present study, the effect of nutrient solution composition on plant growth and quality of *Cichorium spinosum* L. was examined. Five fertilizer treatments were applied through irrigation water differing in the nitrate: ammonium nitrogen ratio of total nitrogen, namely (1) 100:0, (2) 75:25, (3) 50:50, (4) 25:75, 5) 0:100 NO_3:NH_4, while an extra treatment (6) with total nitrogen only in urea form was applied. All the treatments received the same amount of fertilizer units (20-20-20 mg L^{-1} of N, P and K, respectively). Plants were grown in 2 L pots containing peat (Klassman-Deilmann KTS2) and harvested three times during the growing period, and when they reached marketable size. At each harvest day, plant development was assessed (number, fresh and dry weight of leaves, and rosette diameter). The results suggest that nitrogen form has a significant effect on plant growth and yield of *C. spinosum* plants. In particular, fresh weight and number of leaves, and rosette diameter were significantly increased when ratio of nitrate: ammonium nitrogen was 75:25 or 0:100, especially in the 1st harvest, while in the 3rd harvest treatment 100:0 showed the best results. However, this did not affect total fresh weight and number of leaves which were higher for treatments 100:0 and 75:25, respectively. Therefore, higher ammonium nitrogen rates seem to be beneficial for plant development only during the early stages, while at later growth stages nitrate nitrogen has better results. In any case, ureic nitrogen is not suggested since it has severe effects on plant development, probably due to toxicity issues.

Keywords: *Ammonium nitrogen, Cichorium spinosum L., nitrate nitrogen, stamnagathi, urea.*

STUDY OF DROUGHT TOLERANCE IN OILSEED RAPE GENOTYPES UNDER TERMINAL DROUGHT STRESS WATER STRESS

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Abstract

In order to study drought tolerance in oilseed rape genotypes under water stress conditions, an experiment was carried out in a split-plot arrangement based on RCBD with three replications in Karaj, Iran for two years (2012-2014). Treatments included (1): irrigation, in three regimes (I_1: full irrigation as control, I_2: withholding irrigation from flowering stage until physiological maturity and I_3: withholding irrigation from silique formation stageuntil physiological maturity) as main plots and (2): eighteen oilseed rape genotypes as sub plots such as HW113, KR18, HW101, L146, L210, L183, SW101, L5, L201, HW118, KR4, KS12, Karaj1, L73, L72, KS7, Karaj2 and Ahmadi. The combined analysis results demonstrated that the main treatment effects of irrigation and genotypes on silique number per plant,seed number in silique, 1000-seed weight, seed yield, oil percentage and seed oil yield were significant at 1% level probability. Among genotypes, the highest silique number per plant under water stress conditions (withholding irrigation at flowering stage until physiological maturity and withholding irrigation from silique formation) was observed in KS12 (96 and 118, respectively). The maximum seed yield under full irrigation and water stress conditions was observed in KS12 (5520 $kg.ha^{-1}$, 4115 $kg.ha^{-1}$ and 3357 $kg.ha^{-1}$ respectively) that it was due to higher silique number per plant, seed number in silique and 1000-seed weight. Generally, KS12had the highest seed yield and its components under control and water stress conditions, among genotypes.

Keywords: *Oil yield, promising lines of oilseed rape, seed yield, water stress.*

DIRECT REGENERATION POTENTIAL OF GUS TRANSFORMED ROSE (*ROSA HYBRIDA* L.)

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Abstract

Effective and successful regeneration is the critical stage of plant genetic transformation methods. Success in transgenic is paving the way to prepare novel and new desirable genotype especially in cut flowers. In order to investigate regeneration potential of GUS transformed rose plants, direct regeneration from four lines of transgenic plantlet was performed. In our study were used leaf and petiole explants from transgenic rose (*Rosa hybrida* L.), using adventitious organogenesis pathways for plant regeneration. Transgenic lines were obtained by *Agrobacterium tumefaciens*-mediated transformation of embryogenic calli. Explants were cultured on MS medium containing different concentration of (0.5, 1, 1.5 mg/L) TDZ in combination with (0, 0.05, 0.1 mg/L) IBA. Regeneration percentage, time to shoot regeneration, number of adventitious buds per explants and adventitious shoot length were noted. Shoot regeneration was observed after 35 days in most treatments. The result showed that the highest regeneration rate (87%) was obtained by leaf explants in media containing (1.5 mg/L) thidiazuron (TDZ) + (0.05 mg/L) indole-3-butyric acid (IBA) in third line. Combination of TDZ with IBA was more effective for direct regeneration. Increasing Concentration of TDZ from 0.5 to 1.5 mg/l, promotes shoots length. Present results indicate that rose genotype (different transgenic lines) and explants had significant effect on regeneration rate.

Key words: *Rosa hybrid, leaf segments, direct regeneration, TDZ.*

EFFECT OF PLANT GROWTH REGULATORS AND PLANTS DENSITY ON YIELD AND YIELD COMPONENTS OF TWO POTATO CULTIVARS

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Abstract

In order to study the effect of plant growth regulators IAA, GA3 and PLANTS density on yield and yield components of two potato varieties was done. This experiment was carried out in Savin tissue culture laboratory and greenhouse in 2014 seasons. The experiment was factorial based on randomized complete bloke design with the replication separately. In this experiment variety in two stages (Jelly, Banba), effect of density in three stages (100, 150, 200) plants per square meter and growth regulators in four levels (IAA, GA3, IAA+GA3 and control). The results showed that hormone therapy increased the plant height. Combination therapy (IAA+GA3) had the greatest height. Banba cultivar of this treatment have shown greater response. Plants treated with combination therapy regulators with a density of 200 plants per square meter had the highest leaf area. There was no significant difference. Characteristic traits were identified for stolon and sub-stolones. The highest number of tuber was related to combination therapy regulators. There was no significant difference between IAA and GA3. The results showed the maximum length for stolen the type Banba 100 plants per square meter. Combination therapy with regulator & minimum length is for jelly (150-200 ps). No significant difference was between hormone consumed. Plants treated with regulators, respectively shows 30-55-35% increase in plant height, leaf area index for length of stolen compared to the control sample in addition, an increase of 44-66-38 per cent of the number of stolen and sub-stolen and number of tuber per plant can be seen. So consumption regulator of with influence on morphological traits and yield components that affect performance running effective economic performance.

Keywords: *Potato, Growth Regulator, IAA,GA3,Greenhouse.*

ESTIMATION OF COMBINING ABILITY AND GENE ACTION FOR GRAIN AND OIL YIELD IN RAPESEED (*BRASSICA NAPUS* L.) USING THE LINE BY TESTER METHOD

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Abstract

In order to estimate the combining ability, genetic variance components and heritability of traits related to rapeseed (*Brassica napus* L.) grain oil yield, an experiment was designed using the line×tester method. Fifteen hybrids derived from crosses of three spring and high yielding testers (SPN34, RGS003, SPN1), with five lines specific to a hot climate (SPN3, SPN9, SPN36, SPN30, DH4) were tested using a randomized complete blocks design with two replications at the Seed and Plant Improvement Institute in Karaj (Iran) during 2014-2015. The traits under study included: grain yield, biological yield, harvest index, 1000-grain weight, the percentage of oil, and oil yield. The difference among hybrids was significant for all traits, which was a reason for the presence of high genetic diversity among hybrids. The value of additive variance was higher than the dominant type for all traits. The additive variance was important in controlling the 1000-grain weight and biological yield, but for the rest of the traits, two components of variance were included with different values. Referring to high broad-sense heritability (89.84%-98.26%) and low differences between phenotypic and genotypic coefficients of variation, it was concluded that the role of genetical variance was more important than the phenotypic one. The values of narrow-sense heritability were different, from 55.77% of oil yield to 88.67% for 1000-grain weight. Among the tester and the lines, SPN1 as a tester and DH4 and SPN30 as lines were most combinatorial for grain yield and oil yield. In addition, DH4×SPN1, SPN36×RGS003 hybrids were distinguished as the best hybrids and, so it was advised to use their parents in the production of hybrid varieties by using the male sterility system.

Keywords*: Rapeseed, yield components, heritability, combining ability, variation, yield.*

SIMULTANEOUS SELECTION OF MOST STABLE AND HIGH YIELDING GENOTYPES IN BREEDING PROGRAMS BY NONPARAMETRIC METHODS

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Abstract

Explaining genotype by environment (GE) interaction is important in breeding programs because environmental effects are very often greater than genotypic effects in multi-environment trials. Statistical methods that select for high yield and stability have been proposed, but have not been compared for their usefulness especially for nonparametric methods. We compared fourteen nonparametric methods used for analyzing GE interaction at a set of experimental lentil data (11 genotypes at 20 environments). Nonparametric methods consist of six Huehn's statistics (S1, S2, S3, S4, S5 and S6), four Thennarasu's statistics (NP1, NP2, NP3 and NP4), tow Sabaghnia's statistics (NS1 and NS2), Kang's RS and nonparametric method of Fox et al. (1990). Considering mean yield versus nonparametric stability values via their plotting in a plot, indicated four different sections as A, B, C and D. The genotype fall in the section D were the most favorable genotypes due to high mean yield as well as high stability performance. Plot of the most nonparametric methods showed that genotypes G1 (1.21 t ha^{-1}), G2 (1.34 t ha^{-1}) and G5 (1.38 t ha^{-1}) were the most favorable genotypes and so these genotypes considered both yield and stability simultaneously. Although, most of the nonparametric methods have static (biological) concept of stability and measure the real concept of stability but plotting them versus mean yield and selecting the genotypes of section D, could identify relatively the high mean yield genotypes as the most stable ones.

Keywords: *GE interaction, static stability, plotting, mean yield.*

EFFECT NANO-TiO_2 AND NANO-SILICA ON SOME TRAITS OF SUNFLOWER

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Abstract

The most of the cultivated crops are often facing with drought stress and application of some nanoparticles and growth regulators alleviate the adverse effects of stress. Present study is performed to evaluate the effects of foliar application of salicylic acid (S-A), glycine betaine (G-B), ascorbic acid (A-A), nano-silica (nano-SiO_2) and nano titanium dioxide (nano-TiO_2) on yield and yield component of sunflower. Chlorophyll content, leaf length, leaf width, days to 50% flowering, day to maturity, plant height, husk percentage, number of seeds per head, head number per plant, percentage of empty achenes, 1000-seed weight, kernel weight, grain length, straw yield, harvest index, grain yield and oil percent were measured. Results showed that the first two principal components were used to create a two-dimensional treatment by trait biplot that accounted percentages of 49% and 19% respectively of sums of squares of the TT interaction. The vertex treatments were A-A, G-B, Nano-TiO_2 and control which Nano-Ti_2 treatment indicated high performance in chlorophyll content, day to maturity, number of seeds per head, head number per plant, kernel weight, grain length, straw yield, harvest index, grain yield and oil percent. Treatments suitable for obtaining of high seed yield were identified in the vector-view function of TT biplot and displayed nano-silica and nano titanium dioxide as the best treatmentS suitable for obtaining of high seed yield. In short, nano-fertilizer could increase crop yields and improve the fertilizer efficiency.

Keywords: *Nano-silicon dioxide, oil content, drought stress, TiO_2 nanoparticles.*

BIPLOT ANALYSIS OF PRE-SOWING TREATMENTS OF DRAGONHEAD (*DRACOCEPHALUM MOLDAVICA* L.) WITH SOME NANO- PARTICLES

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Abstract

In this research, two types of nano-particles including nano-iron and nano-silicon particles have been investigated in seed priming of dragonhead processing. The pre-hydration treatments were nano-silicon dioxide levels consist on (Si1) 0 mM or distilled water, (Si2) 1 mM and (Si3) 2 mM and nano-iron oxide levels consist on (Fe1) 0 Mm or distilled water, (Fe2) 1 mM and (Fe3) 2 mM. Some seed germination characteristics including germination percent, root fresh weight, shoot fresh weight, root length, shoot length, dry weight of the seed residue, root dry weight and shoot dry weight were measured in each experimental unit. The treatment by trait biplot technique was used to data and showed that the first two principal components, explained 80% of variation. Traits germination percent, root fresh weight, shoot fresh weight, root length, shoot length and root dry weight were in the same sector, with Si2-Fe3 treatment (1 mM nano-silicon dioxide and 2 Mm nano-iron oxide) as the best treatment. The best treatment combination suitable for obtaining of high values of germination properties was determined as S2-F3 (1 mM nano-silicon dioxide plus 2 mM nano-iron dioxide) based on ideal entry biplot tool.

Keywords: *Nanoparticle, Dracocephalum moldavica L. seed germination.*

ASSESSMENT OF GENETIC VARIABILITY AMONG HOT PEPPER LANDRACE OF MALEH VALLEY ACCESSIONS IN MOROCCO

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Abstract

The on-farm conservation of hot pepper in Maleh valley in Morocco has been strengthened thanks to seeds exchange between farmers in relation to its notoriety linked to morphologic and organoleptic quality. The objective of this study was to optimize the genetic resources management and to make better use in plant selection according to consumers' criteria. Thus, genetic polymorphism among and within eighteen farmers' accessions of hot pepper meta-population was assessed using fifteen quantitative and eight qualitative traits of agro-morphological characters, seed storage proteins electrophoresis (SDS-PAGE) and the random amplified polymorphic DNA (RAPD) marker. Biometrical analyses of recorded data were performed to evaluate genetic variability and genetic structure of the meta-population of hot pepper from Maleh valley according to genetic parameters. The result showed high significant differences among genotypes, accessions and among sites for almost all agro-morphological characters. The result of biochemical and molecular analysis showed a large pool genetic according to alleles frequency (Na=1.480), Shannon-Weaver's Index (I=0.285), and expected heterozygosity (He=0.199). The hierarchical analysis of molecular variance shows that 30% of total genetic diversity was assessed among sites, while 44% was assessed within accessions and 26% was assessed among accessions. Moreover, the genetic differentiation between pairwise accessions (PhiPT=0.559**) was exhibited among sites (PhiRT=0.299**) and among accessions (PhiPR=0.370**). Otherwise, Nei genetic distance (NeiGD) approves a strong seed or seedling exchange within or among sites according to requested criteria.

Keywords: *Hot pepper, genetic variability, agro-morphological traits, seed storage proteins electrophoresis (SDS-PAGE), random amplified polymorphic DNA (RAPD) marker.*

FORAGE AND GRAIN PRODUCTION DYNAMICS OF *TRITICALE* SOWN ON DIFFERENT DATES UNDER IRRIGATED CONDITIONS

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Abstract

To study the forage and grain production dynamics of *triticale*, a trial was carried out having four genotypes planted on three different dates under irrigated conditions at Dera Ismail Khan, Pakistan (31°49'53"N 70°54'7"E). All the four genotypes were of different pedigree/parentage background. Trial was laid out in split-plot design with genotypes in main plots while dates of sowing in sub-plots. The trial was replicated three times. First date of sowing started with planting the genotypes on Oct. 25 (T_1) followed by Nov. 15 (T_2), and Dec. 05 (T_3). All the genotypes planted at each date were harvested 50 days after planting. The results showed that the earliest planting produced significantly the highest green forage yield, maximum plant height and grain spike^{-1}. However, grain yield remained similar statistically when planted the *Triticale* on different dates. Comparing the results of four genotypes studied, it was observed that each genotype behaved significantly different for green forage yield, days to 50% heading, plant height, tiller m^{-2}, grains/spike, 1000-grain weight and bio-mass yield. Genotypes 3 and 4 produced maximum green forage yield i.e. 3.70 and 3.65 t ha^{-1}, respectively, however differences among the four genotypes for grain yield were found non-significant statistically. Net Photosynthesis Rate and Chlorophyll content recorded for all genotypes and dates of sowing remained similar statistically. The highest Benefit-Cost ratio (3.23) was calculated for gynotyp-4 when planted on the earliest dates i.e. Oct-05. It was, however, observed that net benefit decreased with delay in each planting date irrespective of the genotypes.

Keywords: *Triticale, sowing dates, genotypes, forage yield, grain yield.*

MECHANICAL SOWING OF SMALL AND VERY SMALL SEEDS (IN ALVEOLI)

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Abstract

The paper presents how to make an equipment for sowing small seed drill, how to use it and the advantages of using it. The equipment consists of the following: cylinder with pressure chamber and piston, vacuum generator, nozzle distribution ramp and other auxiliary components. The small and very small dimensions of some seeds require a small sowing depth and a distance between seeds to ensure germination and vegetative space after emergence. Typically, these seeds are sown in hand-drawn gutters through scattering. Thus the depth of sowing and the distance between the seeds could not be ensured, and after sunrise it is necessary to repace the work, also by doing that it increases the quantity of seeds per unit area, increases the seed expenses and at the same time it requires a high consumption of labor. To ensure very low seed sowing and seed spacing to minimize seed consumption and minimize labor costs to increase productivity to ensure maximum seed growth and seed growth after emergence , small and very small seed equipment have been developed to ensure that the seeds are placed at the depth technologically set and alsoat the tecnological distance, safe and fast. With its simple construction, the equipment has a low price, is easy to make and use, does not require the user's training and even adapts to automate the sowing process.

Keywords: *Sowing, equipment, seeds, depth, distance.*

TARRAGON CULTIVARS (*ARTEMISIA DRACUNCULUS* L.) OF THE NIKITA BOTANICAL GARDENS BREEDING

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Abstract

Tarragon or estragon (*Artemisia dracunculus* L.) is a promising food, a spicy, aromatic and medicinal crop for an industrial cultivation in the Crimea. Long-term breeding tests of the samples of a different geographical origin in the Nikita Botanical Gardens have made it possible to study the special features of development, a plant morphology, productivity, a mass fraction and a component composition of essential oils. Estragon selection was aimed at determination of high productive and high essential oil yield forms with a valuable component composition of essential oil and compact bush shape. It has been found out that raw biomass yield of the studied samples was 110-116 cwt/ha, a mass fraction of essential oil is 0.22–0.61% of fresh biomass and essential oil yield was 24.2-57.2 kg/ha. The main components of essential oil is sabinene - up to 41%, elemicin - up to 30.3%, trans- isoelemicin - up to 32.7%. The valuable components of estragon essential oil are methyl chavicol ($C_{10}H_{12}O$) and its derivates such as methyl eugenol, elemicin, isoelemicin. Two highly efficient cultivars - "Smaragd" with a high content of essential oil promising for use in medicine as a restorative remedy and "Travneviy" that could be used in the food industry as spice, have been created. During the mass blossom the cultivar "Smaragd" plants accumulated a maximum amount of essential oil (up to 0.61% of raw biomass), the main component of essential oil is methyl chavicol mass fraction of which was up to 91%. Mass fraction of essential oil in heads was 0.8%, in leaves - 0.6%, in stems - 0.03% of raw biomass. The raw biomass productivity for "Travneviy" cultivar was 123.4 hw/hectare, mass fraction of essential oil - 0.08% of fresh biomass, essential oil yield - 10.7 kg/hectare. The main components of essential oil are sabinene (40.0%), trans-iso-elemicin - 26.1%.

Keywords: *Artemisia dracunculus L., spice, essential oil, methyl chavicol, sabinene.*

ANALYTICAL INDICATORS OF PLUM FRUIT SENSORY CHARACTERISTIC CHANGES AFTER SEVEN-DAY STORAGE AT ROOM TEMPERATURE

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Abstract

Consumer acceptance of plum is based, primarily, on the corresponding sensory characteristics of the fruits: appearance, colour, firmness, taste and aroma. If not consumed immediately after harvesting, the aforementioned characteristics of plum will change. Still, those changes are less expressed when fruits are kept in cold storage, at low temperatures. However, during the transport and storage of plum at room temperature, which is often the case in local market plum sale, intense changes of certain characteristics of the fruit happens as well as a significant shortening of shelf life. The most expressive is firmness change where fruits become completely soft after seven days. Appearance and colour of the fruit are less susceptible to change. Since plum taste and odour depend on sugar and acid content, i.e., sugar-acid ratio and the content of certain volatile aromatic components, changes of their contents have been examined in some important plum cultivars in Serbia after seven-day storage at the temperature 20±1 °C. Sugar-acid ratio that determines sweetness, i.e., fruit acidity, has not significantly changed during the storage period. Among 10 examined aromatic components, the most significant changes have been observed in 2-E-hexenal, which gives a distinctive green note aroma and nonanal, characteristic plum-like scent. During the seven-day storage of picked plums, the content of 2-E-hexenal decreased while the content of nonanal increased.

Keywords: *Plum, shelf life, sugar/acid ratio, volatile aromatic components, odour activity values.*

PRODUCTIVITY OF BIRDSFOOT TREFOIL ON ACID SOILS

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Abstract

The aim of the experiment was to analyze forage yield, seed yield and seed yield components of the cultivars of birdsfoot trefoil (*Lotus corniculatus* L.) grown in combined production for forage and seed on acid soil. The field trial was established in 2012 in Čačak city area (Serbia) in a randomized block design with three replications on the loessivized vertisol with acid reaction (pH in H_2O 4,8). Trefoil cultivars (K-37 and Rocco) were seeded in a 20 cm row distance with 10 kg ha^{-1} of seed. In the year of planting, due to an expressed dry period, there was no yield, and the analyses were done in the second and the third year of cultivation. Forage yield of birdsfoot trefoil in the first cut in the second year of production was low, which was also the result of the long dry period in the previous year. However, the relatively high seed yield in the second growth in the second year of the cultivation and high forage yield in the third year of the cultivation indicated that the trefoil was largely tolerant to condition of acid soils. The cultivars did not differ among themselves significantly in terms of forage yield. Significant differences between the cultivars were recorded in terms of dry matter content in the time of the cutting. The cultivars also differed among themselves in terms of the seed yield, which was the consequence of the differences in the number of stems per unit area and the number of seeds per pod.

Keywords: *Birdsfoot trefoil, yield, forage, hay.*

EFFECT OF GENOTYPE AND YEAR ON THE PARAMETERS OF WINTER TRITICALE PRODUCTIVITY CULTIVATED IN NORTHERN MONTENEGRO

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Abstract

This paper presents the results of the impact of fertilization and genotype on fertility parameters of winter triticale. The experiment tested five genotypes of winter triticale (Odisey, Kg-20, Triumph, Rtanj and Tango) from different breeding. The genotypes were grown in the north of Montenegro, in Bijelo Polje (Sutivan) over three growing seasons (2009-2012). The researches were carried out on the river alluvium soil type on an experiment designed by randomized block design with three replications. The assessment of winter triticale genotypes was based on the analyzed quantitative and qualitative indicators of productivity (number of grains per spike, 1000 grain mass, hectoliter mass and grain yield). In all three years of the study, genotype Tango had the highest grain yield (5.99 t ha^{-1}), while the lowest yield was observed in genotype Kg-20 (4.48 t ha^{-1}). Also, Tango genotype had the highest value of 1000 grain mass (50.9 g), while the highest hectoliter mass was achieved in genotype Triumph (71.66 kg). The results showed that meteorological conditions, in the three tested years, had a great influence on the yield and quality. The lack of precipitation and extreme temperatures in the third year caused the abrupt termination of grain filling stages which led to a decline in yield and grain quality. The results of these studies would be valuable in terms of its growing as forage crop as well as in terms of its breeding for grain quality and productivity.

Key words: *Triticale, genotype, fertilization, 1000 grain mass, hectolitre mass, yield.*

PLANT HEIGHT AND GRAIN YIELD OF MAIZE IN DIFFERENT CROPPING SYSTEMS

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Abstract

Cropping systems are basically defined by crop rotation. Two crop rotations with winter wheat or three crop rotations with legume crops are the more efficient for maize productivity. When grown in a crop rotation system, maize produces higher biomass, larger leaf area and larger height. Grain yields are also higher and one can also notice other positive effects on agro-ecosystem, including soil and pests. The objective of the study was to evaluate the effects of the cropping systems, namely continuous cropping, two and three crop rotations of maize, on plant height and grain yields and to analyse relations between those two parameters. The study was conducted in an experimental field of the Maize Research Institute Zemun Polje, in Serbia, during 2009-2012. The following factors were evaluated: 1. cropping system of maize - continuous cropping, maize-winter wheat, maize-soybean-winter wheat and maize-winter wheat-soybean rotation; 2. type of hybrid - ZP677 as an older hybrid and ZP606 as a newer, modern hybrid with higher yield potential. The standard technology of maize production was applied. Every year, in the anthesis stage when plants are completely developed, plant height was measured from ten plants per elementary plot while grain yields of maize were determined from two inside rows at the end of the growing season. The data were processed by ANOVA. The grain yield of both maize hybrids was higher when maize was grown in two and three crop rotations in comparison to maize continuous cropping. Newly developed hybrid ZP606 had, on average, a higher yield than ZP677, especially in maize - w. wheat - soybean rotation (8.02 and 10.14 t ha^{-1}). The correlation analysis showed high and positive interdependence between plant height and grain yield of maize in all the investigated cropping systems.

Key words: *Crop rotation, maize hybrid, plant height, yield.*

RAPD ANALYSIS OF GENETIC VARIATION IN NATURAL POPULATIONS OF *AEGILOPS SP.* FROM SOUTH ADRIATIC

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Abstract

New challenges that food production is facing, requires novel approach in agricultural strategy. The scissors of growing demand for food and the limits of the Earth's resources are forcing plant breeders to run for the new borders, utilizing all the available genetic variation in order to create fruitful and economically sound cultivars. *Aegilops* sp. (*Poaceae*) is a potential source of genetic variation for wheat improvement. RAPD marker analysis was used in order to distinguish and evaluate different genotypes of *Aegilops* sp. population samples from the collection gathered during few years' expeditions in South Adriatic, along the coastal, littoral and the inland parts of Montenegro. Ten randomly amplified polymorphic DNA markers (RAPDs) were tested: OPA-05, OPA-08, OPB-06, OPA-02, OPA-07, OPA-25, OPB-07, OPB-18, OPC-06, OPC-10 to examine genetic structuring on 18 samples of 6 populations of different *Aegilops* sp. According to global AMOVA, 75% of total gene diversity was attributable mostly to diversity within population (Φ_{PT} =0.205 p=0.001), indicating that the groups of studied goat grass populations were seemingly to differing genetically. In contrast, 25% of the variation came from variation among populations. According to PCoA, the distribution of 18 goat grass accessions by Principal Coordinate Analysis shows 3 distinct groups. PCo axis 1, PCo axis 2, and PCo axis 3 account for 20.8%, 18.2% and 14.1% of the variation, respectively. The results showed that RAPD markers could be a convenient tool for investigating genetic variation and for detecting genetic structuring of populations. Genetic variability formed under natural selection was entrenched.

Keywords: *Aegilops, goat grass, RAPD, population, genetic diversity.*

VARIABILITY, AMMI AND CLUSTER ANALYSIS FOR QUALITY COMPONENTS OF DIFFERENT WHEAT GENOTYPES

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Abstract

The present study was carried out to investigate the variability and heritability of wheat quality components and to evaluate the stability of ten wheat genotypes in different environmental conditions. The experiment was conducted in the Center for Small Grains in Kragujevac, Serbia during two growing seasons (2010 and 2011). Thousand grain weight had the highest value of GCV and PCV (7.13 and 7.7%), while test weight had the lowest PCV (3.24%) and protein content had the lowest GCV (1.82%). The highest heritability was observed for thousand grain weight (H^2=85.37%), while the lowest one was found for protein content (H^2=19.56%). The AMMI analysis showed significant effect of the G×E interaction, where first main component was significant for all components. Genotypes KG-56, Arsenal and Osječanka are close to the average values for all components and expressed the highest stability. Genotypes with the highest or lowest average values for analyzed traits, such as Norin 10, Mironovskaya 808, Gruža and Spartanka, showed moderate to high instability. Cluster analysis categorized the genotypes into four groups. The genotype Norin 10 showed the highest distance from other genotypes, whereas the stable genotypes grouped together.

Key words: *Heritability, AMMI analysis, stability, cluster*.

IMPACT OF CLIMATE CHANGE ON POTATO YIELD GROWN IN DIFFERENT CLIMATIC ZONE IN BOSNIA AND HERZEGOVINA

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Abstract

The aim of this paper is to examine the impact of climate change on potato yield and propose adaptation measures for three different climatic areas in Bosnia and Herzegovina (B&H). Aquacrop model V4.0 was used for yield estimation. Input bias corrected data for future climatic parameters were obtained from EBU-POM for IPCC/SRES scenarios A1B and A2, for three time lags early future (2010–2039), mid (2040–2069), and end of century (2070–2099), for three distinct areas Banja Luka, Mostar and Bijeljina. Model calibration was based on available scientific papers. Shorter growing cycle of potatoes on the observed areas is expected in future climatic conditions due to an increase in temperature of air. Slightly shortening of growing cycle till the end of the century can be expected in the Mostar area, and it may even increase on the other ones. Sowing date will be moved towards the winter months. Shorter growing cycle could enable the unrestircted growth of potatoes at all sites, because growth would terminate before the on set of the dry season. Obtained data indicate an increase in the yield of potatoes in relation to the reference period, slight in the area of Banja Luka and Bijeljina, but significant in the Mostar to 13.8% in the near future, 28.7% in mid-century and up to 33% by the end of the century. The largest water shortage might occur in Bijeljina (35%), slightly less in the area of Banja Luka, while irrigation is not primarily in the Mostar area, but timely soil drainage instead.

Key words: *Climate change, Aquacrop, potato, yield, irrigation.*

DIVERSITY OF TALL FESCUE (*FESTUCA ARUNDINACEA* SCHERB.) AUTOCHTHONOUS POPULATIONS AND CULTIVARS

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Abstract

Tall fescue (*Festuca arundinacea* Scherb.) is a perennial grass species, with high yield potential and good biomass quality. It is one of the most productive forage grasses under optimum conditions. This species is often dominant in pastures. Also it has been used for intensive production of hay meadows, in pure sown or in mixtures with legumes. When used for forage production it is not usually mixed with other grasses. Variability of initial material (autochthonous populations, breeding populations or cultivars) is basic requirement for successful breeding of this, as well as other species. The investigated collection included eight autochthonous populations and five cultivars. The study was conducted in an experimental field of the Institute for Forage Crops, on degraded alluvium soil type. The trial was set up in a space plant nursery with plant to plant distance 60x60cm as a randomized block design with 30 plants per genotype in two years. The aim was to determine values and variability for the most important phenological (heading date), morphological traits (plant height, length of leaf, width of leaf, the leaf number, panicle length and the number of tillers per plant), dry matter yield per plant and dry matter yield quality. The highest dry matter yield per plant was measured in cultivars K-20, K-19, Belfine and Elfina. Investigated material has demonstrated significant variability within the genotypes for all studied parameters. Also, among populations variability was very statistically significant for all investigated traits. Genotypes used in this study can be a source of genes for improved productivity and quality in further breeding programme.

Keywords: *Tall fescue, variability, autochthonous populations, cultivars.*

VARIABILITY OF TOCHOPHEROLS CONTENT IN MAIZE INBRED LINES

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Abstract

One of the most powerful natural fat-soluble antioxidants are tocopherols or better known as vitamin E. Compared with other staple foods, maize grains contain high level of tocopherols. This research was performed to estimate differences in tocopherols (*α-, β + γ-, δ)* content in 69 maize inbred lines by using high-performance liquid chromatography (HPLC). Among the inbred lines, significant variation was observed in the traits of interest: average γ -tocopherol content was higher in the sweet corn inbred lines (7.10 μg/g) but the average α-tocopherol content was lower (12.99 μg/g) than in the inbred lines with standard kernel type (40.14 μg/g and 13.5 μg/g), respectively. The content of *α*-tocopherol ranged from 2.35 to 38.14 μg/g in inbreds and from 7.66 to 17.79 μg/g in sweet corn inbreds and γ tocopherol content from 12.10 to 105.2 μg/g in inbreds and from 50.09 to 101.32 μg/g in sweet corn inbreds. The lowest level of all tocopherols have inbred K1263. The inbred lines with the highest content of α-tocopherol are TVA 973 and H, and with the highest γ -tocopherol content inbred Yum 1-3 and sweet corn line Esteem-F1-6. Those inbred lines could be used in future breeding programs for improving the tocopherol content of commercial inbred lines.

Keywords: *Genetic variability, inbred lines, maize, tocopherols.*

IDENTIFICATION OF POTENTIAL DUPLICATES IN MAIZE GENE BANKS USING MOLECULAR DATA

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Abstract

The second half of 20th century was with growing awareness of importance of landraces conservation for the future. A total of 2217 maize landraces collected in the former Yugoslavia, are stored at Maize Research Institute (MRIZP) gene bank. Out of them, 222 accessions were from the Republic of Macedonia. During 2014, new collecting missions were organised in the eastern and western part of Macedonia. According to collecting site, kernel type and colour, 12 samples from Macedonian (MK) gene bank were chosen for the comparison and identification of possible duplicates with the 16 accessions from the same area and kernel characteristics within MRIZP gene bank. Duplicate accessions are not valuable for widening diversity and required increased financial and storage capacity. In the last few decades, application of molecular markers for polymorphism investigation at the DNA level has been very successful in genetic diversity studies. Based on molecular analysis by 12 Simple Sequence Repeats (SSR), ten genotypes (five from MRIZP and five from MK gene bank) clustered together, with obtained similarity from 0.687 to 0.844. The pair (ZP 1172 and FZNH010040058), had the highest similarity and could be treated as duplicate for MRIZP gene bank. Application of DNA markers, unaffected by environment, successfully discriminate closely related genotypes and possible duplicate accessions. Since identification of absolute genetically identical samples is possible only by comparison of complete genome, that is not necessary for samples considered as duplicates in gene bank management.

Key words: *Accessions, duplicates, landrace, maize, SSR.*

FLORISTIC COMPOSITION AND ABUNDANCE OF WEED COMMUNITY IN MAIZE UNDER DIFFERENT FERTILIZATION TREATMENT

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Abstract

This paper deals with results of the effects of different fertilizers on floristic composition and abundance of weeds in maize. The survey was conducted during two-year period (2014-2015) in white maize hybrid ZP 655b. Trial was set up on chernozem soil type in the experimental field of Maize Research Institute in Zemun Polje, Serbia. The objective of the study was to identify floristic composition of weeds, their abundance and biomass in regard to different fertilization treatment. The treatments of fertilization consisted of following variants: control, mineral fertilizer AN, microbiological fertilizer Uniker and organic fertilizer under the trade name „Humus Vita Stallatico". The fields were surveyed according to the quantitative survey method by using a 1 m x 1 m quadrat with 4 samples of quadrat from each 20m^2 plot. On the basis of two-year results it is obvious that meteorological conditions have very significant influence on floristic composition and abundance of weed community in maize. A total 17 different species in boath seasons, with 3 grasses and 14 broadleaves, were identified. The weediness in both years was relatively high but significanly higher in 2015. Average weed density in the plots was 26 plants per m^2 in 2014 and 31 plants per m^2 in 2015. According to results, the fresh and dry biomass of weeds was significantly higher in treatment with microbiological fertilizer in both years followed by treatment with organic fertilizer. Based on abundance and biomass the annual weeds *Solanum nigrum* L. and *Chenopodium hybridum* L. were the most dominant species in 2014, while perennial weed *Sorghum halepense* L. and annual weeds *Bilderdykia convolvulus* (L.) Dum. and *Portulaca oleracea* L. were the most dominant species in 2015. The major percentage of the species falls under the life forms Therophytes and Geophytes, which have been assessed after comparison with the normal world spectrum as proposed by Raunkiaer.

Keywords: *Floristic composition, weed abundance, biomass, maize, fertilizer.*

THE WHEAT PLANT HEIGHT AND SPIKE TRAITS PHENOTYPIC VARIATION AS A RESPONSE TO ABIOTIC STRESS CONDITION OF HALOMORPHIC SOIL

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Abstract

An increment of human population and limitations of resources on planet Earth require a novel approach in agriculture. One of the ways to fulfill these requirements is to using a less productive land. Utilization of marginally suitable land is an ongoing process. However, a novel genetic variability is required, as well as, the testing of the existing genetic variation for the best possible utilization of these soils. There is about 120000ha of halomorphic soil, solonetz type in Serbia, mainly used as a pasture. The results in this study represent a part of multiyear research of wheat genetic variation grown in abiotically stressful condition of high sodium content of solonetz soil. Three wheat varieties, namely, NSR 5, Pesma and Renesansa were tested for the reaction, through phenotypic variation, in parallel three years trial on chernozem and solonetz soil for plant height and the spike productivity traits, spike length and weight, grain number and weight per spike, and the spike index (SI). Phenotypic variation of individual plants plays more significant role in the grain yield formation in stressful conditions. The variation was examined using AMMI analysis. According to AMMI ANOVA, statistically significant influence of the environment on total trial variation was denoted, as well as, genotype by environment interaction. Results indicate the occurrence of desirable variation within the existing genetic variability that could be exploited to enhance the use-value of less productive land for food production.

Keywords: *Wheat, soil, stress, yield components.*

YIELD COMPONENTS AND GENETIC POTENTIAL OF WINTER BARLEY

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Abstract

The experiment was established in the experimental field of the Small Grains Research Centre in Kragujevac (Serbia) during the 2011/12 and 2012/13 growing seasons. The objective of this study was to investigate the influence of genotype and environment on the yield of winter barley cultivars (Jagodinac, Maksa, Rekord and Grand). The following characteristics were analysed: grain yield, 1000 grain weight and test weight. The highest yield of all tested varieties of winter barley was achieved by Grand (5.081 t/ha), Maksa (4.902 t/ha) and Rekord (4.871 t/ha), while the lowest yield was obtained by Jagodinac cultivar (4.733 t/ha). The lowest 1000 grain weight for all studied locations/sites and the year was recorded for the cultivar Jagodinac (42.60 g), and the highest the cultivar Grand (49.02 g). The largest two-year average value of test weight was found in the cultivar Grand (69.87 kg/hl), and lowest in cultivar Rekord (69.39kg/hl). Very highly significant influence of the cultivar on 1000 grain weight was established at investigated winter barley cultivars by variance analysis, while genotype influence on grain yields, 1000 grain weight and test weight were highly statistically significant. Significant differences in grain yield at investigated barley cultivars were found relative to the interaction environmental factors and cultivars

Key words: *Cultivar, grain yield, winter barley.*

WINTER WHEAT YIELD AND YIELD COMPONENTS DEPENDING ON THE LEVEL OF NITROGEN, PHOSPHORUS AND POTASSIUM FERTILIZATION

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Abstract

Effects of mineral nutrition efficiency of wheat have been studied at the stationary field trial of the Small Grains Research Centre in Kragujevac (Serbia) for two years (2008/09 and 2009/10). In this paper, average yields from 7 treatments of increasing doses of nitrogen, phosphorus and potassium nutrients have been studied. The objective of this study was to investigate the influence of mineral nutrition on the yield of winter wheat varieties Takovčanka. Investigation showed a considerable variation of grain yield depending on mineral nutrition. The study showed that most investigated wheat cultivar achieved their highest grain yields less than 120 kg/ha nitrogen rate, phosphorus rate of 100 kg/ha P_2O_5 and potassium rate of 60 kg/ha K_2O (3.622 t/ha). Thousand grain weight of wheat significantly varied across years, the highest average thousand grain weight of winter wheat cultivar investigated was achieved in the NP2K variant with the higher phosphorus rate (42.47 g). Analysis of variance was found to have the highly significant effect of years on 1000 grains weight and test weight, and significant effect of years on grain yield. Different combinations of fertilization had the most highly significant influence on grain yield and thousand grain weight. Positive correlations were observed between grain yield and thousand grain weight in all years. Grain yield was significantly positively correlated with 1000-grain weight only in the 2008/09 ($r=0.66^{*}$) and 2009/10 ($r=0.79^{*}$). Significant positively and medium correlations were observed between 1000-grain weight and test weight in P treatment.

Key words: *Fertilization, yield, quality, wheat.*

SEED QUALITY OF THE FACELIA-VARIETY NS PRIORA GROWN IN SERBIA

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Abstract

Phacelia has been used for seed production and as a forage crops, either on its own or in a mix with peas or vetch to provide forage and honey production as a source of high quality nectar and pollen. The experiment was carried out in 2016, in the fields of the Institute of Field and Vegetable Crops in Bački Petrovac, in Serbia, with variety NS Priora. NS Priora had plant flowering continualy over 60 days and had high, good quality grain yield. NS Priora variety had average nitrogen content is 3.21%, protein content was 20.06% and the average thousand seeds weight was 1.42 g. Phacelia is presently very intensively used in organic agriculture and for sowing of arable land temporarily excluded from production which achieves high yields.

Keywords: *Phacelia, variety NS Priora, honey plant, seed quality, thousand seeds weight.*

THERMAL INACTIVATION KINETICS OF PEROXIDASE IN GALEGA KALE (*BRASSICA OLERACEA* L. VAR. *ACEPHALA* CV. GALEGA)

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Abstract

The consumption of *Brassica* spp. is quite high and it represents an important part of a well-balanced diet in the northwest of Spain. Seasonality and perishability cause that some of these vegetables are in the necessity of applying preservation technologies. Some of these technologies are frequently preceded by blanching. In general, the blanching limits the losses of nutritive and organoleptic qualities during processing. Peroxidase is one of the most heat-resistant of vegetable enzymes, which has led to it being used as an indicator of the adequateness of the blanching process. This enzyme has also been associated with losses in the colour, flavour and nutritional values of raw and processed foods. The inactivation of peroxidase depends on the temperature of the blanching water and the type and size of the vegetable. Galega kales (*Brassica oleracea* var. *acephala*) area popular vegetable among people from Northwest Spain, which are easy to find among local markets. Blanching was applied in this study in order to examine the inactivation of peroxidase in Galega kales. The objective was to obtain kinetic parameters of peroxidase inactivation that can be used in further analyses. Inactivation experiments were carried out at five different temperatures ranging 75–95ºC. The peroxidase activity was followed spectrophotometrically at 470 nm. Kinetic parameters, D and *z* values, were also determined. Fresh Galega kale had high initial peroxidase activity in this study. The enzyme inactivation was dependent on temperature and heating time. Peroxidase activity showed first-order kinetics with *z* values of 15.51ºC.

Keywords*: Peroxidase, Galega kales, blanching, inactivation, kinetic parameters.*

OPTIMIZING WATER PRODUCTIVITY, YIELD AND QUALITY OF GRAPEFRUIT IRRIGATED BY BUBBLER AND SURFACE IRRIGATION UNDER KHARTOUM STATE SUDAN CONDITIONS

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Abstract

The experiment was carried out in the private orchards at Tayba Alhasnab area of south Khartoum State, in Sudan during 2012 and 2013 to evaluate the water productivity, yield and quality of foster grapefruit irrigated by bubbler and surface irrigation system. Irrigation interval was 5 days in bubbler irrigation system and every 7 to12 days in surface irrigation system depending on the prevailing weather conditions. The results revealed that higher yield and number of fruits was obtained on bubbler irrigation system compared to surface irrigation system. Moreover, bubbler irrigation system increased the total yield of foster grapefruit by 28% and 25%, respectively as compared to surface irrigation system. Applying irrigated water under bubbler irrigation system improved the quality parameters of foster grapefruit such as fruit diameter recorded significant differences on bubbler irrigation system compared with surface irrigation system in both years, fruit weight and peel thickness recorded significant differences ($P \leq 0.001$) between bubbler irrigation system and surface irrigation system on finger weight, but on differences in peel thickness in both years, total soluble solids of foster grapefruit irrigated by bubbler irrigation system were significantly higher ($P \leq 0.001$) compared with surface irrigation system in both years. However, bubbler irrigation system saved irrigation water by 68% and 71% and had highest water productivity (2.9 and 2.7 kg/m^3) compared to surface irrigation system (0.67 and 0.68 kg/m^3). Also highest marginal rate of return was obtained with bubbler irrigation system compared to surface irrigation.

Keywords: *Grapefruit, bubbler irrigation, surface irrigation, water productivity, crop evapotranspiration.*

EVALUATION OF THREE INTRODUCED WINE GRAPE VARIETIES UNDER A RAIN-FED SYSTEM OF AGRICULTURE IN SYRIA

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Abstract

The present study was carried out by the General Commission for Scientific Agriculture Research – Pome and Grapevine Division in Sweida Province (Syria) during 2014 and 2015 to evaluate three introduced wine varieties Carignan, Cabernet Sauvignon and Chardonnay, under a rain-fed system of agriculture. The results indicated that bud burst in the two varieties, Carignan and Chardonnay, happened on 25th April, and in Cabernet Sauvignon it was on May2nd.Carignan and Cabernet Sauvignon significantly were more vigorous than Chardonnay in blade length and width, internode length and diameter. Cabernet Sauvignon had the highest length of bunch (158 mm), while there was no significant variance in bunch width among all the studied varieties. Carignan significantly showed higher values of bunch weight (328.4 g), berry length, width and weight, must yield and tree yield. A chemical analysis of must showed that Chardonnay variety insignificantly had higher total soluble solids (23.2%) than the two other varieties, and there was no significant variation in total sugar as well among studied varieties, while Chardonnay significantly showed the lowest total acid content (5.5 g/L) than the other two varieties. Consequently, the results revealed distinct traits that encourage us to use the studied wine varieties in the similar environmental conditions.

Key words: *Grape, Carignan, Cabernet Sauvignon and Chardonnay cultivars, evaluation.*

EVALUATION OF THE BEHAVIOR OF SOME *PISTACIA VERA* FEMALE GENOTYPES IN THE SOUTH OF SYRIA

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Abstract

This investigation was conducted by the General Commission for Scientific Agricultural Research- Scientific Agricultural Center in Sweida and in pistachio fields during 2012- 2015. The aim of the investigation was to evaluate the behavior of some *P.vera* female genotypes (6 Ashouri, 2 Batouri, 2 Ajami, 1 Beadi and 2 Turkish genotypes) through determining the most important parameters used for evaluating the adaption and success of pistachio cultivation. All studied Ashouri genotypes tended to bloom earlier (12-21th March) than other genotypes, whereas the full flowering period of the two Turkish genotypes werelate (1-4thApril). The largest nut dimension was 1.95cm in BatouriGhrahibeing significantly differentthan all other studied genotypes. The percentage of dried kernel weight to total dried nut weight was 50.55% in fluffy AshouriMawardi genotype, while it was 39.63% in AshouriLesan Altair genotype. The split nuts percentage ranged between 7-93%.Three cases of blank nuts were defined; some of them are newly registered: 1. The barthinocarpy phenomena: The oval grows for a short time without fertilization. 2. Abnormal kernels:The kernel occupies just 1/3 of the shell plenum, and in some cases the kernelseemed to be sticky. 3. The decomposition of the cotyledon's endosperm into a sweet liquid, also the kernel in this case occupies just 1/3 of the internal space inside the shell. The current results indicate there is a huge genetic diversity of female *P.vera* species, which are still cultivated marginally and have important commercial traits as BatouriGhrahi and Fluffy AshouriMawardi genotypes. These genotypes are supposed to be separated cultivars and need to be identified at molecular level for the purpose of identification; i.e. to be confidently credited as commercial cultivars by the governmental nurseries within the Ministry of Agriculture in Syria.

Keywords: *Pistachio, P.vera, behavior evaluation, blank nuts, split nut percentage.*

OPTIMAL HARVEST DATE OF THE APPLE ROYAL RED CULTIVAR FOR LONG STORAGE IN THE SOUTH OF SYRIA

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Abstract

This investigation was done during 2011-2012 by the General Commission for Scientific Agriculture Research- Pome and Grapevine Division in Sweida province (Syria), to determine the optimal harvest date of the Royal Red apple cultivar for long-term storage. The fruits were harvested five dates in one-week intervals from 20thSeptember to 18th October, and then stored at 0° c and 95% relative humidity for seven months. The changes in main physical and chemical indicators were measured on monthly basis. The results showed that after 7 months of storage the lowest significant weight loss was 2.2% in the fruits harvested on11th October, while it was 5.1% and 4.3% in the fruits harvested on 20th September and 18th October, respectively. The highest fruit flesh firmness was 5.4 kg/cm2 in the fruits harvested on 4th October, followed by 5.2 kg/cm2firmess in the fruits harvested on 11th October and 27th September. The highest total soluble solids and total sugars were 18.6°B and 16.7%, respectively, in the fruits harvested on 11th October. Consequently, 11th October was the best harvest date for the fruits to achieve high storability with the following indicators: temperature accumulation 1943° c. days, 164 days after full bloom, starch index 4, flesh firmness 6.6 kg/cm2 and total soluble solids 14.5%. These results indicate the importance of determining the harvest date for each cultivar in order to reduce weight loss and improve fruit quality during long storage.

Key words: *Apple, long-term storage, harvest date and weight loss*.

EFFECT OF A MAGNETIC TREATMENT OF SALT WATER ON SEED GERMINATION

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Abstract

A magnetic treatment of water is an innovative technology in the field of agriculture. Hence, a study was run to evaluate the impact of magnetized salt waters on seeds germination (tomato Rio grande, Commun corn and Turnip guebsi). A comparison was made for germination percentage (%) and root length (mm) between the treatments and the control. In addition, the effect of the magnetic treatment on water properties was investigated. A magnetic treatment device (MTD) with a magnetic field of 13.5 mT was used. Three ranges of salinity (2.1 g/L; 4.2 g/L and 6.6 g/L) were used in addition to distilled water as a reference. The results showed a decrease in the electrical conductivity values after passing the water samples through the MTD. The pH showed an increasing tendency that stabilized after 24 hours. The germination percentage (%) and root length (mm) were higher than in the control group for the different ranges of salinity, for all the seeds. Corn germination under the magnetized salt water of 4.2 g/L showed the highest ratio, reaching 28% higher than control. The best root development was observed in the tomato seeds with 24% longer, always with the magnetized salt water of 4.2 g/L comparing to control. In conclusion, our study shows that a magnetic treatment improves the germination ratio and root length of seeds.

Keywords: *Magnetic water treatment, salt water, germination, root length, seeds.*

DETERMINATION THE EFFECTS OF NITROGEN DOSES ON HAY YIELD AND QUALITY CHARACTERISTICS OF SOME OAT CULTIVARS/LINES

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Abstract

In order to healthy ruminant feeding, they must eat high quality forage and at least half of feed should consist of forage. Though oat commonly use food and feed in the world, our country main usage area of oat is feeding as forage and kernel. The climatic characteristics of Samsun are very suitable for oat requirements. The aim of this study is to determine the effects of 5 different doses of nitrogen, on hay yield and mineral matter content of 2 oat varieties and 1 oat cultivars/lines. The experiment was established according to split plots design with 3 replicates in 11 November 2016. Harvest was made when oat become dough stage. During harvest 500 g sample was taken for each plot and dried in an oven at 60 ^{o}C temperature until constant weight. Then these samples grounded and analysed protein, ADF, NDF and mineral contents. The effect of applied nitrogen doses on hay yield was very significant and dry hay yield changed between 5589.68 – 20237.69 kgha^{-1}. The highest leaf ratio was determined to Line 38 (37.55%). Results obtained for Ca concentration in this study were more than these recommended values. Mg concentration of genotypes were ranged from 0.07% to 0.13%. This study showed that N doses had great effect on hay yield, crude protein, ADF and NDF content of oat cultivars and line. N15 and/or N20 doses can be recommended in similar ecological conditions regarding the genotype.

Keywords: *Oat, nitrogen dose, hay yield, mineral content.*

EFFECT OF CROP ROTATION ON HAY YIELD AND PROFITABILTY

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Abstract

This study was conducted to determine total yield and profitability of legume x cereal mixtures and silage corn rotation during 2013-2014 and 2014-2015 growing seasons in Yozgat, Turkey. Firstly, Hungarian vetch (*Vicia pannonica* Crantz) and cereals (*Hordeum vulgare* L., *Triticum aestivum* L. and T*riticosecale* Wittmack) were sown as binary mixtures with different seed rates (100:0%, 70:30%, 60:40%, 50:50% 40:60%) and harvested at the flowering and milk dough stages. Then silage corn was sown. The experiments were arranged in split plot design with four replications. According to combined results the highest total hay and total crude protein yield were obtained from the Hungarian vetch + barley mixture with 70:30% seed rate cutting at flowering stage and fallowed by silage corn (32.4 t ha^{-1} and 3.13 t ha^{-1}, respectively) while they were the lowest in silage corn sowing over the fallow at the second sowing time (19.5 t ha^{-1} and 1.44 t ha^{-1}, respectively). Profitability analysis was pereformed in two ways; hay price and meat conversion of hay. The maximum profit was obtained from Hungarian vetch + barley mixture with 70:30% seed rates and first cutting time treatment as 4776.60 $/ha and 13213.09 $/ha, respectively based on hay price and meat conversion of hay methods. As a result, Hungarian vetch + barley mixture with 70:30% seed rate and cutting at flowering stage of barley may be the most appropriate treatment for both Hungarian vetch + cereal mixtures and silage corn in terms of yield and economic return in Middle Anatolian conditions.

Keywords: *Hungarian vetch + cereals mixture, silage corn, hay yield, crude protein yield, profitability.*

DETERMINATION OF APPROPRIATE SOWING DENSITY FOR THE FORAGE PEA IN SAMSUN (TURKEY) CONDITIONS

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Abstract

Forage pea is an important annual leguminous plant that can be grown solely or together with other cool season cereals as a hay, pasture or silage plants. It has huge potential in Turkey because of its ability to adapt to humid and cool climatic conditions. There is no research on forage pea sowing rates and frequency in Black Sea region of Turkey. The aim of this study was to determine the best sowing rate and sowing frequency by using Golyazi cultivar. The experiment was established in a split plot design with 3 replicates on 28 February 2017. The sowing rates were 80, 100 and 120 viable seeds m^{-2}; inter row spacing distances were 20, 30 and 40 cm. The harvest was carried out on 8 June, when the legumes started to grow on the lowest nodes. During harvest, 500 g of sample was taken from each plot and dried in an oven at 70 ^{o}C until it reached a constant weight. Hay ratio and yield were calculated from the dry to fresh weight ratio. The samples were then ground and analyzed for protein, ADF, NDF and mineral content. The highest hay yield (708 kg da^{-1} was obtained from the crop sown by 120 seeds m^{-2} with 20 cm inter row spacing. The hay yield was significantly increased in 120 seed m^{-2} plots and there was no difference between 80 and 100 seeds m^{-2} plots. When observed by inter row spacing distance, the highest hay yield was obtained from the crop sown at the distance of 20 cm. The hay yield sharply decreased at 30 cm and slightly increased again at 40 cm. There were also some significant differences among the treatments in terms of other characteristics.

Keywords: *Forage pea, yield, quality, sowing rate.*

APPLICATION OF MULTI CRITERIA DECISION TECHNIQUE TO DETERMINE THE BEST CHICKPEA CULTIVARS WITH HIGH ANTIOXIDANT POTENTIAL

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Abstract

In this study, technique for order preference by similarity to ideal solution (TOPSIS) analysis, which is multi criteria decision making method, was firstly applied to rank the most suitable cultivars among 12 registered chickpeas for high antioxidant potentials. Registered chickpea cultivars were grown in trial fields of state research institute in 2015, Adana, Turkey. The cultivars were analyzed for the criteria such as their water-soluble protein content (WSPC), total phenolic content (TPC), free radical scavenging activity (FRSA) and iron chelating activity (ICA) which were related to their antioxidant potentials. However, depending on each criterion, the ranking of the cultivars was completely different so that TOPSIS analysis was applied to the obtained data in six steps. Firstly, the decision matrix was constructed and then each criterion was weighted as respectively 0.40, 0.30, 0.20, 0.10 for FRSA, TPC, ICA, and WSPC by the researchers. After the weighted normalized decision matrix was constructed, the positive ideal and negative ideal solutions were determined. Then the separation measures for each alternative were calculated (Si* and Si- for the separation from positive and negative ideal alternative, respectively). Finally, the relative closeness to ideal solution was calculated (Ci*). The cultivar Seçkin with the highest Ci* value (0.776) was the first rank and followed by Aydın, Azkan, and Çakır. This study showed the usefulness of TOPSIS analysis in the multi criteria decision making process when the presence of different parameters related to same property of sample set such as antioxidant potential of chickpea cultivars.

Keywords: *Multi criteria decision technique, TOPSIS, chickpea, antioxidant potential.*

STUDIES ON THE ADAPTATION OF QUINOA (*CHENOPODIUM QUINOA* WILLD.) TO EASTERN ANATOLIA REGION OF TURKEY

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Abstract

Quinoa (*Chenopodium quinoa* Willd.), an Andean crop, is native food plant of high nutritional value and its cultivation is increasing rapidly in the World. Background studies should be conducted on the determination of appropriate quinoa varieties for different ecologies for its cultivation to become widespread in a healthy way. This study was conducted in 2015 and 2016 in Erzurum and Igdir non-irrigation conditions in the Eastern Anatolia of Turkey. The locations have different ecological characteristics from each other. The field experiments were conducted with 9 varieties in each location in a randomized complete blocks experimental design with four replications. The grain yield and some related characteristics were examined in the study. The grain yield and related characteristics of quinoa varied significantly depending on varieties and locations in the study. According to the two-year results, quinoa cultivation is a risky in Erzurum which has a high altitude and short vegetation period. The grain yields ranged between 110-599 kg ha^{-1} and was found to be quite low. In the Igdır location, 933-1646 kg ha^{-1} of seed yield was obtained from the varieties. The earliest cultivar is Q-52, it has matured in Erzurum at 102 days, Igdir at 118 days. The latest maturation (138 days) was determined in the Oro de Valle cultivar in Igdir conditions. According to these results, moqu Arrochilla, Q-52, Oro de Valle, French Vanilla and Rainbow cultivars can be recommended for non-irrigated conditions of these locations provided that it is seeded early in the spring. However, Erzurum and similar locations are not suitable for the agriculture of this plant due to short plant growing period.

Key words: *Chenopodium quinoa, adaptation, seed yield, highlands, dry conditions.*

PERFORMANCE OF ALFALFA UNDER DIFFERENT INTERCROPPING TREATMENTS

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Abstract

This study was aimed to investigate the yield and quality pattern of alfalfa stand under different intercropping treatments. Alfalfa was intercropped with sorghum-sudangrass hybrid, soybean, cowpea, and buckwheat at seed ratio of 100%:100%, 100%:80%: 100%:60% and, 100% alfalfa was used as control. The experiment was arranged in randomized block design with three replications and conducted at the research field of Bozok University located in inner Anatolia, Yozgat-Turkey. Alfalfa and companion crops were sown as binary mixtures with 70 cm row distance in the spring of 2015. All the data was collected in the establishment year and the first production year (2016). Hay yield, protein yield, ADF (acid detergent fiber), NDF (neutral detergent fiber), Ca, Mg, P and K content were investigated in all the treatments. Alfalfa intercropped sorghum-sudangrass hybrid at 100%:60% seed ratio produced the highest hay yield both in the establishment year (18.25 t/ha) and the first production year (17.91 t/ha). This study showed that intercropping increased hay and protein yield of alfalfa stand compare to sole alfalfa with the significant effect of companion crop and seed ratio.

Keywords: *Alfalfa, intercropping, sorghum, buckwheat, hay yield*.

DETERMINATION OF ADAPTATION AND QUALITY TRAITS OF SOME COOL SEASON TURF GRASSES IN SAMSUN CONDITIONS

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Abstract

This study was carried out in order to determine adaptation and some quality traits of some cool season turf grass cultivars at randomized plot design with 4 replicates in Ondokuz Mayis University Experimental Area during 2010-2012 years. Plot size was 2 m² (1×2 m). In the research 5 cultivars of *Festuca arundinacea* (FA), 6 cultivars of *Lolium perenne* (LP), 5 cultivars of *Festuca rubra commutate* (FRC), 6 cultivars of *Festuca rubra rubra* (FRR), 5 cultivars of *Festuca ovina* (FO), 7 cultivars of *Poa pratensis* (PP), 2 cultivars of *Poa trivalis* (PT), 1 cultivar of *Agrostis stolonifera* (AS), 2 cultivars of *Agrostis capillaris* (AC), 1 cultivar of *Agrostis tunius* (AT) and 1 cultivar of *Festuca rubra trichophylla* (FRT)were used. Time to emergence (day), time to covering (day), winter hardiness (1-9), covered ratio (1-9), regeneration trait (1-5), tiller number (1-5), general appearance (1-9), weed ratio (1-5), sparsely ratios (1-9) were investigated. In terms of time to emergence and time to cover the earliest values were obtained from LP cultivars (16.12 and 42.66 days, respectively), the latest values were observed to FRR and FO cultivars. When consider together with winter tolerance, covered ratio and regeneration traits, cultivars of FA were the best. The highest tiller number and the least sparsely ratios were determined to FA cultivars. Weed problem was not observed for all cultivars but PP and PT. There were no differences in terms of general appearance among the cultivars except for PP and PT cultivars. Consider the all investigated characteristics of cultivars, price and abundance of seed and cultivation process, *F. arundinacea*, *Lolium perenne* and some *Festuca rubra* cultivars are very suitable in order to use green areas in Black Sea Region of Turkey.

Key words: *Turf grass, adaptation, quality, winter hardiness.*

THE EFFECT OF DIFFERENT SOWING DATES AND SOWING DENSITIES ON GRAIN YIELD AND SOME YIELD COMPONENTS OF DIYAR-95 CHICKPEA VARIETY UNDER DRY CONDITIONS IN DIYARBAKIR (TURKEY)

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Abstract

This study was carried out to determine the effect of different sowing date and sowing density on the yield and yield components of chickpea during 1995-96 and 1996-97 growing seasons in Diyarbakır rainfed conditions (Turkey). In the experiment, Diyar-95 chickpea variety was used, and it was sown at five sowing times (15 November, 15 December, 15 January, 15 February and 15 March) and five sowing densities (22.2, 27.7, 33.3, 38.8, 44.4 plant m^{-2}). The result of this study indicated that the grain yield was significantly influenced by the different sowing dates and sowing densities. According to average two years grain yield changed from 1092 to 2193 kg ha^{-1} with respect to sowing date. The highest grain yield was observed in 15-th December sowing date (2193 kg ha^{-1}), whereas the lowest grain yield was observed in 15-th March sowing date (1092 kg ha^{-1}). The grain yield varied with the different sowing density. According to average two years grain yield changed from 1464 to 1997 kg ha^{-1} with respect to the different sowing density. The highest grain yield was obtained with the most density (44.4 plants m^{-2}), whereas the lowest grain yield was obtained with the most widely space (22.2 plants m^{-2}).

Keywords: *Cicer arietinum L., sowing date, sowing density, yield, yield components.*

ESTIMATE OF QUANTITATIVE HERITABILITY IN SOME CHICKPEA GENOTYPES *(CICER ARIETINUM* L.*)*

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Abstract

This investigation was carried out to study of some agronomic characters (plant height, first pod height, 1000-seed weight andgrain yield) and estimate genetic variability parameters for the studied traits of chickpea.The study was carried out as randomized block design with four replications in the research area of GAP International Agricultural Research and Training Centerin Diyarbakir, during 2000, 2001 and 2002 growing seasons. In the study, eighteen chickpea advanced lines provided from ICARDA and two control cultivar (Diyar-95 and ILC-482) were used. According to the average of three years, plant height ranged from 45.3 to 56.6 cm, this character was exhibited high heritability (0.90). The mean first pod height of chickpea genotypes ranged from 24.2 to 34.5 cm, this character showed high heritability (0.85). The mean 1000 seed weight of chickpea genotypes ranged from 264.1 to 354.9 g, the 1000 seed weight showed high heritability (0.89). The grain yield varied from 1316.0 to 1851.0 kg ha^{-1}, it showed moderate heritability (0.52).The study showed that some parameters(plant height and thousant grain weingt) can be use as selection criteria in Chickpea, because of high heriability values.

Keywords: *Cicer arietinum, genetic variability, yield, traits.*

STATE AND PROSPECTS OF SUNFLOWER PRODUCTION IN UKRAINE

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Abstract

Sunflower (*Helianthus annuus* L.) is among the three most significant oilseed plants in the world (along with, soybean and rapeseed) and one of the two most produced oil crops in the European Union, together with rapeseed. Over the past decade, Ukraine has maintained its position as leading producer and exporter of sunflower seeds and ranks first for sunflower oil consumption globally. A recent United States Department of Agriculture report in 2017 suggest that, Ukraine presently (2015−2016) ranks first in sunflower production globally with a 29.3 % share of total world sunflower output of 40.57 million metric tons. Respectively, Russia and the European Union are currently ranked second and third, with a share of 22.6 % and 18.9 %, followed by Argentina and China that produced 6.7 % each. The main goal in sunflower breeding is to create hybrids with high genetic potential for seed yield above 5 t/ha, but environmental factors seems to limit current sunflower yields to the production range of 1.5–3.0 t/ha. In this study, however, we report new sunflower varieties and hybrids in Ukraine that yield even slightly above 3 t/ha. Thus, a unique sunflower production technology for the forest-steppe of Ukraine for instance now provides sunflower seed yields of 2.9-3.5 t/ha. This became possible after the introduction of new high-yielding varieties and hybrids, and the improvement of sunflower cultivation technologies for specific natural and climatic zones. Hence, further increases in global sunflower seeds output mainly from Ukraine are expected without expansions in limited agricultural lands.

Keywords: *Sunflower, varieties and hybrids, Yield, environmental factors, Ukraine.*

EFFECT OF HEXACONAZOLE ON THREE PURPLE SWEET POTATO VARIETIES IN THE MEKONG DELTA

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Abstract

Hexaconazole has been so far reported to show several properties in plant growth regulations. This study was conducted to evaluate the enhancement of hexaconazole on the growth, yield and quality of three purple sweet potato varieties (Ipomoea batatas (L.) Lam.) in Mekong Delta. The experiment layout was randomized completely block design, in factorial arrangement with three replications. Three purple sweet potato varieties used in the experiment were HL491 from Vietnam and two varieties imported from Japan (Lord) and Malaysia. Hexaconazole of 0, 10, 15, and 100 mg/L (farmers' practice) were spayed at 40, 55, and 70 days after planting (DAP). The results showed that the fresh vine biomass/m^2 and the anthocyanin content of the HL491 variety were the highest, but the number of marketable tuberous roots and total tuberous yield were lower than the two imported varieties. Hexaconazole application inhibited some agronomical characteristics such as the total leaf area, internodal and leaf petiole length at 60 DAP and reduced the fresh vine biomass (kg/m^2) at harvest. The highest marketable tuberous quantity, 21 tuberous roots/m^2, was achieved when spraying hexaconazole at 15 mg/L while the marketable tuberous yield and anthocyanin content were 26 tons/ha and 16.2 mg/100g fresh weight (FW) equivalent to CGE, respectively. These values were higher than those counterparts of the control: 15 tuberous roots/m^2; 8.05 tons/ha and 13.4 mg CGE/100 g FW.

Key words: *Anthocyanin, hexaconazole, Ipomoea batatas (L.) Lam., tuberous quality, tuberous yield.*

CORRELATION OF PRECIPITATION WITH YIELD GRAIN AND VARIABILITY OF MAIZE PRODUCTION OF REPUBLIC OF SRPSKA (BOSNIA AND HERZEGOVINA)

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Abstract

During the period from 2000 to 2016 the corn yield in the Entity of Republic of Srpska (RS) in Bosnia and Herzegovina varied, both by years and by individual production regions. According to data from the Institute of Statistics of Republic of Srpska, the lowest yield was 1,96 tha^{-1} in the production area of Banja Luka in 2003, and the highest in 2016 in Novi Grad 6,76 tha^{-1}. Numerous factors have the influence on the maize grain yield. The maize producers can not affect the climate conditions, from which the achievement of yields greatly depends. It is particularly reflected in the drought years. By using data of the distribution and amount of rainfall for the six municipalities in RS, correlation coefficients of precipitation and maize grain yield were calculated by Hartung. It was found that the good and positive correlation value was manifested near Bijeljina for the period July-August (0,749), and in the average for all places in the same period (0,709) and production year (0,711). The maximum value of the correlation of monthly precipitation was recorded in August (0,683), which was manifested in the drought years (0,789). By a comparison of the obtained results, it was noted that in the dry years the coefficient was adequately lower for production-year and July-August rainfall and also higher in August and during the interval from January to March. It can be concluded that the precipitations before and during fertilization had the greatest impact on the achievement of maize grain yield, as well as on the formation and initial maize grain filling.

Keywords: *Maize, yield, precipitation, correlation, Republic of Srpska.*

INFLUENCE OF FOLIAR ANTIBROADLEAVED HERBICIDES ON LENGTH OF THE PRIMARY ROOT OF COTTON SEEDS (*GOSSYPIUM HIRSUTUM* L.)

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Abstract

The trial was carried out during 2013-2015, comprising twelve cotton cultivars - Chirpan-539, Helius, Trakia, Viki, Filipopolis, IPK-Veno, Boyana, Avangard, Natalia, Darmi, Dorina and Nelina (*Gossypium hirsutum* L.). Influence of herbicides Bazagran 480 SL (bentazone), Pulsar 40 (imazamox) and Express 50 SX (tribenuron-methyl) was studied. These herbicides were used during the budding stage of cotton. The herbicide Bazagran 480 SL has the highest phytotoxicity on the length of the primary root of seeds of the cotton cultivar Trakia and the lowest on the cultivar Natalia. The herbicide Pulsar 40 has the highest phytotoxicity on the length of the primary root of seeds of the cotton cultivar Dorina and the lowest on the cultivars IPK-Veno and Natalia. The herbicide Express 50 SX has the highest phytotoxicity on the length of the primary root of seeds of the cotton cultivar Boyana and the lowest on the cultivar Helius. From the aspect of cotton growing technology, technologically the most valuable are cultivars Viki, Filipopolis, IPK-Veno, Boyana, Avangard, Natalia, Darmi, Dorina and Nelina by foliar treatment with herbicide Bazagran 480 SL. Technologically the most valuable are cultivars Chirpan-539, Helius, Viki, IPK-Veno, Boyana and Natalia by foliar treatment with herbicide Pulsar 40. Technologically the most valuable are cultivars Helius and Trakia by foliar treatment with herbicide Express 50 SX. These variants combine high lengths of the primary root and high stability of this index during the different years.

Key words: *Cotton, herbicides, foliar treatment, cultivars, length of primary root.*

INFLUENCE OF SOME HERBICIDES AND THEIR MIXTURES WITH GROWTH REGULATOR AND FOLIAR FERTILIZER ON COTTON SEED GERMINATION (*GOSSYPIUM HIRSUTUM* L.)

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Abstract

The trial was carried out during 2013-2015, comprising two cotton cultivars – Helius and Darmi (*Gossypium hirsutum* L.). Herbicides Goal 2 E (oxifluorfen), Linuron45 SC (linuron), Wing P (pendimethalin + dimethenamid), Merlin 750 WG (izoxaflutole), Bazagran 480 SL (bentazone) were studied. These herbicides were used alone or in combinations with the growth regulator Amalgerol premium or the foliar fertilizer Lactofol O during the budding stage of cotton. The foliar treatment with tank mixtures Wing P + Amalgerol and Wing P + Lactofol lead to the highest seed germination in case of the cultivar Helius. The foliar treatment comprising the herbicide Bazagran or the tank mixture Bazagran+ Lactofol leads to the highest seed germination in case of the cultivar Darmi. The highest phytotoxicity on seed germination of the cultivar Helius was recorded after using the herbicide Merlin and the tank mixture Goal+ Amalgerol. The highest phytotoxicity on seed germination of the cultivar Darmi was recorded after using the herbicide Linuron and its tank mixtures with Amalgerol and Lactofol. From the aspect of cotton growing technology, technologically the most valuable are combinations of all herbicides with Lactofol, which are followed by Linuron + Amalgerol, Wing + Amalgerol, Merlin + Amalgerol and sole use of herbicide Bazagran on cultivar Helius. Technologically the most valuable are herbicides Goal and Bazagran and tank mixtures Goal + Amalgerol, Merlin + Amalgerol, Bazagran + Amalgerol, Wing + Lactofol and Bazagran + Lactofol on cultivar Darmi. These variants combine high lengths of the seed germination and high stability of this index during the different years. The sole use of the herbicides Linuron and Merlin has low assessment and should be avoided.

Key words: *Cotton, herbicides, foliar fertilizer, growth regulator, seed germination.*

INFLUENCE OF ENVIRONMENT ON YIELD STRUCTURE CHARACTERISTICS AND GRAIN YIELD OF PEAS GROWN IN SOUTH-CENTRAL BULGARIA

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Abstract

Pea is a valuable leguminous crop essential for the balanced nutrition of men and animals. The aim of study was to establish the relationship between yield and yield characteristics of grain legumes spring pea (*Pisum sativum* L.) and wintering pea (*Pisum arvense* L.) and impact of climate factors of Central South Bulgaria on peas yield. The survey was conducted during 2004–2013 in the experimental base of the Plant Growing Department at Trakia University, Stara Zagora. The experiment was conducted by the block method in 4 repetitions. The plants were grown according to the conventional technology. Results obtained for the grain yield and structure components were statistically processed by ANOVA and regression equations among the yield and climatic parameters were developed. It was established that in the environment conditions of Bulgaria *P. sativum* were high productive, compared to *P. arvense*. Good correlations were found between the morphological characteristics. Interpopulation variation (94.48 – 99.90%) of the grain yield and yield characteristics was significantly higher compared to the intrapopulation. The values of the yield and yield structure characteristics depend in a great extent of climatic parameters. Regression equations were developed on this base, which allows preliminary assessment of peas grain productivity with approximate accuracy for practical purposes. Studies to determine the effect of pea variety and year showed that climate conditions over the years as factor had the highest impact on the yield (68.72%). The type of pea as factor had a higher effect on the morphological parameters and yield structure elements (42.54 – 96.28%).

Keywords: *Equations, peas, climatic conditions, yield, morphological characteristics.*

BEAN (*PHASEOLUS VULGARIS* L.) GERMINATION AND SEEDLING GROWTH AS AFFECTED BY SILVER NANOPARTICLES

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Abstract

Silver nanoparticles (AgNPs) are one of the most widely used engineered nanoparticles (ENPs) that are expected to enter natural ecosystems. This study reports on the effect of soaking three cultivars (Bronco, Nebraska and Valantino) of the common bean (*Phaseolus vulgaris* L.) for 12h in aerated solution of gum Arabic-coated silver nanoparticles (GA-AgNPs ≈16.7nm), polyvinyl pyrolidine- coated silver nanoparticles (PVP-AgNPs ≈23 nm), and silver nitrate ($AgNO_3$), each at 0.0, 10, 20, 40, 60, 80 and 100 ppm, on germination and seedling growth. The control and the treated seeds were germinated at 25°C ±0.5 under dark controlled conditions for 7 days. AgNPs and $AgNO_3$ significantly improved germination percentage, germination rate and seedling growth criteria of the three tested cultivars, as compared with their corresponding controls. The three cultivars responded in more or less similar trends to the different concentrations of the treatment solutions. With the three cultivars under study, the magnitude of improvement was always greater for GA-AgNPs than for PVP-AgNPs and $AgNO_3$. Moreover, both AgNPs and $AgNO_3$ up to100 ppm significantly increased the activities of polyphenol oxidase, peroxidase and catalase than those of the control. Meanwhile, the enzyme activities progressively increased with the increase of each of the AgNPs under investigation, as well as $AgNO_3$. The results indicated successful use of AgNPs and $AgNO_3$ up to 60 and 40 ppm, respectively, for enhancing the germination potential and subsequent seedling growth of the bean cultivars under study.

Key words: *Bean, Phaseolus Vulgaris, silver nanoparticles, silver nitrate, antioxidant enzymes.*

APPLICATION OF AUGMENTED DESIGNS FOR FIELD EVALUATION OF BREAD WHEAT DOUBLED HAPLOID LINES: A PRELIMINARY REPORT

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Abstract

Doubled-haploid is an effective method to produce 100% homozygous lines in a single generation accelerating the release of new varieties and reducing the corresponding expenses. However, the existing problem in cases where the adequate quantity of seeds is limited is the inability to evaluate new germplasm in replicated experiments. In his attempt to confront this problem, Petersen proposed in 1985 the evaluation of new germplasm to be based on its division in blocks and selection to be performed regarding the yield of the randomly repeated control in each block. The aim of the present study was to use the aforementioned method to evaluate preliminary 37 doubled-haploid lines (DHL). The parental varieties of the DHLs,Greek cultivars "Acheloos" and "Vergina", were used as controls. For the purpose of the study, 35 main spikes, one form each DHL and control, were used. The length of the spikes was measured, the number of spikelets was counted, and the 1000 kernel weight and total yield were recorded. The data analysis revealed that only one line exceeded the mean number of spikelets of the controls, one exceeded the mean yield of the controls and two exceeded the mean 1000 kernel weight of the controls (one was even better than the best control). The reported results indicate the presence of valuable genetic variability among the DHL after crossing cultivars "Acheloos" x "Vergina". Further research is needed, after DHLs multiplication, using more plants and locations to draw more reliable conclusions.

Keywords: *Block, control cultivar, traits, analysis, genetic variability.*

COMPARING THE YIELD OF PULSES USING DIFFERENT INTEGRATED CROP MANAGEMENT STRATEGIES: A CASE STUDY IN INDIA

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Abstract

Poor population in India amounts to more than 300 million people, with almost 30 percent of rural population living in poverty. An estimated 43 per cent of children under the age of five years are malnourished (WFP, 2012). Pulses, being rich and cheap source of protein can supplement the diet for poor and malnourished people. Pulse crops can be grown in almost all types of climate and comes to harvest by 3-6 months of duration, with a minimum amount of water requirement. Keeping these things in view this study has been designed to study the production techniques viz., integrated crop management including integrated pest, diseases, weeds and nutrient management in pulses and also the cost of cultivation in the north coastal regions of Southern India in five locations each. The yields under each traetment that is ICM practices Vs farmers practices and also the cost benefit ratios in each crop and each location were studied and their average means were compared for analysis. The results of the study in case of pigeon pea, Mung bean and Urd bean will also give further directions and help to develop the concrete strategies through the implementation of the interventions in a mission mode byactively engaging all stake holders at various levels for the increased and sustainable pulse production under the National food security Mission Programme being implemented by Government of India to keep India as a zero hunger country in forthcoming years with safe and secured nutrition.

Keywords: *India, food security, pulses, ICM practices, Zero hunger.*

USE OF LOCAL COMPOSTED WINERY WASTE FOR LETTUCE PRODUCTION IN LEBANON

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Abstract

Recently, the Lebanese wine sector has been witnessing a non-precedent growth producing huge amounts of winery wastes referred to as grape marc. The effect of using grape marc compost on lettuce (*Lactuca sativa* L.) production was investigated in an open-field experiment in Central Bekaa. Seedlings of the Romaine variety were planted in different substrates: S1: 100% soil or control, S2: 75%soil + 25% grape marc compost, S3: 25%soil + 75% grape marc compost and S4: 100% grape marc compost. Root growth, leaf growth and leaf characteristics were compared among the different mixtures. Tests showed that the grape marc compost contained acceptable values of nitrogen, phosphorus, potassium, organic matter and a perfect germination index ranking between 0.8 and 1 for the direct and diluted solutions. Results showed that at early stages of growth, the best results were obtained from plants grown in the substrate S4. However, at later stages of growth, grape marc compost with a percentage higher than 50% (S4) in the mixture induced lower averages of leaf number, length and width of largest leaf and leaf weight and those higher than 25% (S3 and S4) increased dry matter and total soluble solids content due to its low water holding capacity causing a water stress on plants. Root growth was proportional to increased percentages of grape marc compost. Finally, composted grape marc provided the highest benefit to plants when added to soil in quantities of 25% by volume allowing the best yield increase (47%) compared to control.

Keywords: *Lactuca sativa, grape marc compost, water holding capacity, plant growth.*

INVESTIGATING THE EFFECT OF ARBUSCULAR MYCORRHIZA *GLOMUS* Sp. AS A BIOFERTILIZER ON LETTUCE PRODUCTION

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Abstract

Arbuscular mycorrhiza used recently as biopesticide has shown beneficial effects on plant growth. An experiment was conducted in West Bekaa in 2016 in order to investigate the effect of a commercial biostimulant (MYCOSAT) containing 5 *Glomus* species on the production of two lettuce varieties: Romaine and Iceberg. Plant growth and nutritional quality were compared between mycorrhizal plants (mycorrhizal Romaine: MR and mycorrhizal Iceberg: MI) and non-mycorrhizal plants (non-mycorrhizal Romaine: NMR and non-mycorrhizal Iceberg: NMI). Measurements were done on root and leaf parameters and results showed a significant positive effect of mycorrhizal inoculation on plant growth. Best results were obtained for root parameters as well as leaf area and leaf weight in mycorrhizal plants of both varieties compared to non-mycorrhizal plants. An improvement was found in root length, root diameter, number of secondary roots and root weight by 81%, 81%, 61% and 60% for MR plants and of 80%, 88%, 84% and 94% in MR and MI in comparison to NMR and NMI. Leaf number was only enhanced in MI plants. The improved crop performance was associated with an ameliorated nutritional status with higher percentages of N, P, and K in leaves and was correlated to a stronger root development in mycorrhizal plants due to the action of arbuscular mycorrhiza. Finally, the application of the biostimulant MYCOSAT could provide a biological tool for improvement of growth and quality of lettuce grown in clay soils of West-Bekaa.

Keywords: *Bekaa, Lactuca sativa, Arbuscular mycorrhiza, root growth, plant growth.*

THE EFFECT OF FOLIAR FERTILIZING ON THE CHEMICAL COMPOSITION OF PEPPERS GROWN IN PROTECTED SPACES IN THE STRUMICA AREA IN THE REPUBLIC OF MACEDONIA

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Abstract

The influence of foliar fertilizing on the chemical composition of peppers grown in protected spaces in the Strumica area was examined. The experiment was set in four variants and three repetitions. The variants used in the experiment were, as follows: Control (untreated variant); NPK+Ever green (55% organic matter, 2%w/w Mg, 2%w/w Fe, 2%w/w Zn, 2% w/w Mn, 0.5 %w/w Cu, 0.5 %w/w B); NPK+Biolinfa (34% organic matter, 3% N, 5.80 % K_2O); NPK+Oligomix (1.20 % B, 0.10 % Cu, 4 % Fe, 1.50 % Mn, 0.10 % Mo, 2 % Zn). The experiment was set in 18 rows, and each variant and repetition comprised 62 plants. During the vegetation period, 7 foliar treatments were made with listed fertilizers at a concentration of 0.4%. Before setting up the experiment, an agrochemical analysis of the soil was performed enabling the researchers to determine good soil fertility with available nitrogen and potassium, and average fertility with available phosphorus. Foliar fertilizing had a positive influence on the chemical composition of the peppers. In the variants treated with different organic fertilizers the researchers recorded a higher content of the analyzed parameters than in the control, untreated variant. The highest average content of dry matter (14.80%), the highest average content of ash (0.90%) and the highest average vitamin C content (120 mg/100g) were determined in the pepper in Variant 2. The highest average content of nitrogen (1.37%), phosphorus (0.53%), potassium (2.25%) and calcium (1.42%) was also determined in the pepper in Variant 2. The highest average magnesium (0.38%), iron (0.0067%) and manganese (0.0017 %) content was determined in the pepper in Variant 3.

Key words: *Foliar fertilizing, peppers, protected spaces.*

MORPHOLOGICAL CHARACTERISCS OF FRUITS OF SOME BIFEROUS FIG (FICUS CARICA L.) VARIETIES GROWN IN MONTENEGRO

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Abstract

The results of a two-year study (2015-2016) on main morphological characteristics of eight biferous varieties of fig are presented in this paper. The research was carried out on three „white“ skin varieties ('Sultanija Bijela', 'Petrovača Bijela' and 'Skadranka'), and five „black“ skin varieties ('Crna Sušilica', 'Crna Rapka', ' Petrovača Crna ', 'Crna Sultanija' and 'Krutska Crna'). The highest weight of fruit (111.27 g) was registered in first crop of variety 'Sultanija bijela', statistically significantly higher compared with other varieties, except 'Crna Petrovača'. First crop of 'Crna Sušilica' variety had the lowest mass of fruits (21.87 g), lower than second crop of this variety, what is rarity, and also registered in 'Crna Rapka' variety. 'Crna Petrovača' (85.32 g) and 'Sultanija Bijela' (80.21 g) had the highest weight of flesh, statistically significantly higher than other varieties. 'Sultnija Bijela' has the elongated-pyriform shape of fruit (width/length ratio 0.53), while the variety 'Crna Sušilica' has flat-pyriform shape (1.14). There was a highly significant correlation between weight of fruits and weight of flesh (r=0.9813**), and weight of fruits in relation to width of fruit (r=0.8341**). Morphological characterization can be a useful tool in distinguishing varieties and the first step in their evaluation.

Keywords: *Morphological characteristic, fig, Ficus carica* L.

RELATIVE FEED VALUE (RFV) OF ALFALFA-GRASS MIXTURES AFFECTED BY SPENT MUSHROOM SUBSTRATE AND SLURRY APPLICATION

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Abstract

The study was conducted on experimental plots between 2012 and 2015, in a completely randomized arrangement and with three replications. The aim of the experiment was to evaluate the effect of spent mushroom substrate and slurry on productivity and nutritional value of dry matter of hybrid alfalfa-grass mixtures. In the experiment three plant species were used: hybrid alfalfa, orchard grass, and perennial ryegrass. These species were sown as three legume-grass mixtures. Organic fertilizers, i.e. spent mushroom substrate and liquid manure, or slurry, were used in different combinations. In this paper, dry matter digestibility was estimated. Based on the fraction of neutral detergent fibre, acid detergent fibre, and dry matter intake (% body weight) were calculated. Additionally, relative nutritional value, which is an indication of relative feed value, was estimated. In comparison with mushroom substrate, slurry application resulted in higher digestibility of the legume-grass mixtures, higher dry matter intake, dry matter content, and relative food value. Forage of the ryegrass and alfalfa mixture had the most favourable dry matter intake and relative food value.

Keywords: *Spent mushroom substrate, slurry, mixtures, relative feed value, dry matter intake*

THE EFFECTIVENESS OF DIFFERENT OVERDRILLING TECHNOLOGIES OF THE DRY MEADOWS IN CENTRAL POLAND

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Abstract

The nutritive value of bulk fodder produced from grassland is dependent on the botanical composition of sward and the proportion of valuable grass and legumes species. The aim of the study was to evaluate the effects of overdrilling of dry meadows depending on the treatment of the sward existing before renovation. The study was carried out in central Poland, in the valley of the river Pisia Tuczna (37 km west of Warsaw), on degraded permanent grassland, which had been extensively managed and fertilized. The competitiveness of the original sward before overdrilling (performed by a Vredo slot seeder) was reduced by: (1) low cutting without herbicides, (2) selective herbicides, (3) non-selective herbicide, (4) rototilling. The effectiveness of those treatments was compared with the control object which was not subjected to any treatment and was not fertilized. Dry matter yields, botanical composition of each cut and contents of the mineral macronutrients were measured according to Polish Norms or research procedures. The applied renovation technologies resulted in an increase in yields (in average from 86% to 125%) compared to the yield of the control original sward. The highest yields and the share of the sown species were obtained in the case of overdrilling preceded by rototilling (in average 6.62 $Mg \cdot ha^{-1}$ and 58.2% respectively) or spraying by non-selective herbicide (in average 7.09 $Mg \cdot ha^{-1}$ and 55% respectively). *Dactylis glomerata* L. was the most useful species to overdrilling of dry meadows, irrespective of technology (average 41-50% of sown species). The differences in the contents of macronutrients in the meadow sward were determined primarily by changes in species composition, which occurred to stay under the influence of the applied oversowing technologies and fertilization. The contents of phosphorus (0.36-0.40% P), potassium (1.44-1.68% K), magnesium (0.23-0.26% Mg), calcium (0.85-0.97% Ca) and sodium (0.20-0.23% Na) in the swards' dry matter fully covered the animals' feeding requirements.

Keywords: *Grassland renovation, yields, botanical composition, content of mineral macronutrients: N, P, K, Mg, Ca, Na, Poland.*

CONTRIBUTIONS FOR ENRICHMENT OF BELL PEPPER ASSORTMENT IN ROMANIA

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Abstract

Bell pepper is grown in Romania as an annual plant, cultivated both for fresh consumption and processed products. To aid Romania in enriching its assortment of bell peppers, new cultivars are being developed for local climatic conditions and for supporting the industry demands. Any breeding process can only be initiated if there is available a valuable biological material, which means that there is a sufficiently large variability of the characters and attributes that characterize the material in order to choose the genotypes in accordance with the objectives pursued. That is why research begun with the evaluation of the biological material held in the germplasm collection. Based on that evaluation, it was found that from the total of 214 *Capsicum spp*. genotypes, a number of 42 genotypes demonstrated genetic stability in the descendant, a number of 54 genotypes were included in genetically advanced accessions group and a number of 118 genotypes had been proved to be segregant. During the breeding work a number of 42 genetically stable genotypes were used as initial material for achieving new cultivars. The research undertaken within the breeding program was completed with two new crops that had been tested for 3 years in open field and cold greenhouses. The control variant used in this experiment was a well known Romanian bell pepper variety, Galben Superior. Two new varieties, Ideal (A3) and Carmin (A70) which have shown valuable characteristics and are in conformity with the international standards imposed by the DUS test are currently in the process of being patented.

Keywords: *Capsicum annuum* L., *Carmin, Ideal, breeding, variety.*

EFFECT OF PROPAGATION METHOD ON SWEET CORN QUALITATIVE PROPERTIES

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Abstract

Experiment set up in 2014 aims to investigate shortening of sweet corn growing period with application of some technological elements: propagation time, propagation method, floating row cover. The choosen variety was a conventional sweet corn hybrid, very early ripening 'Spirit'. The following growing technologies were compared: 1. Plants transplantation with floating row cover, 2. Direct sowing of plants with floating row cover, 3. Direct sowing of plants with no row cover (regarded as control). The transplanted plants had shorter growing period 19 days, compared to direct sowed covered treatment and were 21 days earlier harvested than control. Interaction of growing technology and plants covering had also a favourable effect on some important morphological properties of ears such as weight of husked and unhusked ears, ear length, ear diameter, length of kernel.

Key words: *Earliness, sweet corn, transplantation, fleece covering*.

FALENSKAYA 4 WINTER RYE RESPONSE TO LONG TERM FERTILIZER APPLICATIONS

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Abstract

The impact of increasing rates of mineral fertilizers on Falenskaia 4 winter rye yield. agrophysical and agrochemical properties of the ploughed soil layer was determined in 2011-2013 as part of long-term field test trials, founded in 1972-1974.The field experiment was carried out on heavy loamy sod-podzolic soil with humus content 1.54%, pH_{KCl} – 5.4, high P_2O_5 and K_2O content. Long-term (over 40 years) fertilizers application ($N_{60}P_{60}K_{60}$ ha $^{-1}$ and more) caused the humus level to rise from 1.54 to 2.18 %, labile phosphorus - from 296 to 399, soluble potassium - from 187 to 324 mg/kg with slight soil acidification (pH_{KCl} varied from 4.82 to 5.12) and improvement of soil agrophysical properties, including the valuable silt fraction and an increase in water-stable particles. Mineral fertilizer applications had no direct effect on soil density, which was more influenced by phase of the vegetation period : increasing from 1.18÷1.23 during the tillering stage to 1.54÷1.61 g/cm³ during the grain milk- ripe stage. Improved nutritional conditions due to the joint impact of mineral fertilizers and organic matter from the root remains and crop residues promoted raised the yield of winter rye by 1.15 – 1.47 t ha $^{-1}$ compared with the control (no fertilizers). Maximum yield and crop return in the field trial found in the treatment $N_{60}P_{60}K_{60}$ ha $^{-1}$ – 4.48 t ha $^{-1}$ and 8.2 kg of grain – respectively for 1 kg of mineral fertilizers active substance. Further increment of mineral fertilizers rates to winter rye caused plant lodging. and losses while harvesting and yields decreased as a result.

Key words: *Winter rye, mineral fertilizers, agrophysical, agrochemical soil properties, yield.*

HUMUS CONTENTS IN SOILS OF ALEKSINAC MUNICIPALITY IN SERBIA

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Abstract

Humus is a very important soil component, which is a source of nutrients and is a factor in fertility preservation. An analysis of 4.346 soil samples from 743 farms at the location of Aleksinac municipality, whose total area is 1.747,57 ha, has found that 0.2% of the samples belong to the class of very poorly humified soil, containing organic matter up to 1%. It has also been found that 43.3% of the samples belong to the class of poorly humified soil, with the organic matter content ranging from 1% to 3%. Furthermore, 55.2% of the analyzed soil samples belong to the class of well-humified soil, with the humus content ranging from 3% to 5%. The lowest value was found in one of the samples from the village of Rsovac, and it was 0.08%, while 4 out of 5 samples with the highest humus values were found in the village of Aleksinacki Bujmir (9.98% was the highest value that was found). Chemical analysis were performed in 2015, in the Agricultural Advisory and Professional Service - Nis, where the humus content was determined by using the Tyurin method. Soil samples were taken from a depth of 0-30 cm in field crops and vegetable cultures, or 0-60cm in orchards. The results obtained are consequence of insufficient application of organic fertilizers, excessive use of mineral fertilizers, inadequate agricultural technology, irrational removal of crop residues and their burning. The organic matter content in the analyzed plots of Aleksinac municipality, as well as throughout Serbia, is under a strong anthropogenic influence. In accordance with this, the removal of crop residues without prior analysis and determination of organic matter in soil is not recommended and, in particular, the burning of crop residues should be avoided.

Keywords: *Humus, organic matter, soil.*

CHANGES IN FRUIT QUALITY OF STRAWBERRY CULTIVAR 'JOLY' DURING HARVEST

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Abstract

The aim of this research was to determine differences in physico-chemical properties of strawberry in four harvest time (T1: 05.05.; T2: 13.05.; T3: 22.05.; T4: 29.05.). The research was conducted in an experimental planting of strawberry cultivar 'Joly'at the Fruit Research Institute, Čačak (Serbia). Strawberries were planted in August 2015 in double rows on beds covered with black polyethylene foil. Physico-chemical properties such as fruit mass, size, (length and width), shape index, firmness, total soluble solids and antioxidant capacity were investigated. Results showed that major changes in fruit were developmentally regulated. Significant decreases in mass and size coupled with significantly decline in antioxidant capacity were determined at T3 and T4 time. Shape index was higher in fruits gathered at T3 compared to another harvest times. On the other hand, significantly higher total soluble solids and firmness were observed in the fruits collected at T3 and T4 time. The obtained results underline the important role of harvest time on quality characteristics of strawberry 'Joly'. Fruit harvested in the first half of harvesting season showed a good physical properties and antioxidant capacity, which could positively influence the fruit marketing. The best performance in terms of fruit firmness indicates better shelf life of fruits harvested in the second half of the harvesting season.

Keywords: *Strawberry, harvest time, physico-chemical properties*.

EFFECT OF GROWING SEASON AND GENOTYPE ON WINTER WHEAT QUALITY

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Abstract

In this study, 11 winter wheat cultivars (KG-56S, Toplica, Perfekta, Takovčaka, Aleksandra, Vizija, Planeta, Kruna, Harmonija, Rujna and Premija) were investigated. The research was conducted in experimental field of the Centre for Small Grains Kragujevac (Serbia) during two growing seasons (2012/13, 2013/14). Variability of bread-making quality properties (sedimentation value and wet gluten content) was investigated. Quality components depended significantly upon genotype and environment factors. For a two-year average, sedimentation value varied from 23.33 ml (Premija) to 33.33 ml (Aleksandra, Planeta and Harmonija). The analyses of variance showed highly significant differences in sedimentation values between genotypes (F=244.273**), investigated years (F=717.176**), as well as their interaction (F=50.767**). The highest wet gluten content on average was established at KG-56S cultivar (39.63 %) and the lowest at Kruna (27.92 %). There were highly significant differences in the wet gluten content among genotypes (F=81.622**), investigated years (F=816.569**), as well as their interaction (F=25.974**). The analysis of phenotypic variance indicated that the highest impact of variance for sedimentation value belonged to genotype, while the highest impact of variance for wet gluten content belonged to year.

Key words: *Wheat, cultivar, quality, sedimentation value, gluten content.*

THE EFFECTS OF HYDROGEL AND ZEOLITE TREATMENT ON ORNAMENTAL FLOWERS TRANSPLANTS

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Abstract

This research was conducted in order to examine the influence of zeolite and hydrogel, on the growth of *Tagetes patula* var. Disco Marietta and *Salvia splendens* var. Fuego transplants. Both, zeolite and hydrogel have ability to improve physical and mechanical properties of the soil, they increase its ability to retain water and nutrients. The experiment was set in a split-plot design with a total of 100 plants for each species. Four different media were studied: plants potted in commercial substrate, plants potted in the combination of commercial substrate and zeolite (90:10),plants dipped in the solution of hydrogel and water ($2gr/dm^3$) and then potted in commercial substrate, plants dipped in solution of hydrogel and water ($2gr/dm^3$) and then potted in the combination of commercial substrate and zeolite (90:10).Depending of species, different parameters were observed. For *Tagetes patula* in this research the measured parameters were: the height of plants, number of formed leaves, length of formed leaves and the number of formed flowers. To examine the influence of zeolite and hydrogel on the growth of *Salvia splendens* transplants following parameters were measured: height of the plants, number of formed leaves, height of the flowering stem, number of formed flowers. The results of this research showed that the use of the combination of zeolite and hydrogel, or separately is recommended for production of these plants. The best results, for *Tagetes* were given by the transplants that were treated with the combination of zeolite and hydrogel, while the measured parameters of *Salvia* were highest if the transplants were treated with zeolite only.

Keywords: *Tagetes, Salvia, zeolite, hydrogel, flowers.*

EFFECT OF NITROGEN ON YIELD AND NITRATE CONTENT IN POTATO TUBERS

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Abstract

The production of potatoes, as a highly labor-intensive and profitable vegetable and field crop, requires fertilization, especially the use of nitrate fertilizers, as a major cultural operation. To determine the most favorable nitrogen application rate that would ensure high yields along with optimum nitrate accumulation in potato tubers, a field trial was established using different types (urea and CAN) and rates (50, 100 and 200 kgN/ha) of nitrogen fertilizers in two potato cultivars (’Lizeta’ and ’Kondor’). The experiment was conducted on a leached soil under the agroenvironmental conditions of Mountain Radočelo (slopes of Mountain Golija) in Serbia. Results showed that, in both cultivars, average potato yields were higher under CAN treatment (’Lizeta’ 32.511 kg/ha; ’Kondor’ 32.952 kg/ha) than under urea treatment (’Lizeta’ 31.877 kg/ha; ’Kondor’ 29.142 kg/ha). Increasing rates of nitrogen and treatments with urea and CAN led to an increase in soil nitrate nitrogen after plant uptake, but its content was lower in all treatments than before trial establishment. Nitrate nitrogen levels in the soil were higher after urea fertilization (12.2 mg/kg) than after CAN treatment (7.6 mg/kg). Average nitrate accumulation was higher in potato tubers fertilized with CAN, particularly in ’Lizeta’ (’Lizeta’ 236.2 mg/kg; ’Kondor’ 198.3 mg/kg), whereas the use of urea gave an average nitrate content of 208.4 mg/kg in ’Lizeta’ and 174.7 mg/kg in ’Kondor’.

Keywords: *Potato, nitrogen fertilizers, yield, nitrate content.*

THE NUMBER OF *AZOTOBACTER* SP. DEPENDING ON SOIL TYPE AND AZOTE QUANTITY UNDER "UGAR" AND SOWN CORN

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Abstract

The entire quantity of microorganisms and some of their ecophysiological groups represent the most significant factor of soil fertility under the sown growing plants. In this research, we have determined the number of *Azotobacter* sp., the group of free azotofixators depending on the soil type, the manner of the soil cultivation and the quantity of the applied N fertilizer. Sowing of the soil samples from which *Azotobacter* sp. was isolated, had been done on the selective fertile Fjodor ground. We estimated the influence of two soil types, "cernozem" and "gajnjaca", on the quantity of *Azotobacter* sp. The microfield observation of the "cernozem" soil type was set on the location of Zemun Polje (Serbia) while the microfield observation of the soil type "gajnjaca" was set on the location of Rača Kragujevačka. The quantity was estimated on "ugar" and under the sown corn. We studied the growing quantities of azote fertilizers, N_{30}, N_{60}, N_{120}, N_{180} kg ha^{-1}, on the quantity of *Azotobacter* sp. The control was with no fertilizer. The quantity of *Azotobacter* sp. showed the depending result on the soil type, the manner of the soil cultivation and the applied fertilizer quantity. The high quantity of the applied azote fertilizer had an inhibitory influence on the number of this group of microorganisms.

Keywords: *Microorganisms*, *Azotobacter*, *soil*, *azote*, *corn*.

EFFECT OF DIFFERENT *SEED TREATMENTS* ON THE *DORMANCY BREAKING* AND GERMINATION OF DARWIN'S BARBERRY (BERBERIS DARWINII HOOK)

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Abstract

Darwin's barberry is a decorative, medicinal, edible and low demanding evergreen shrub, grown as an ornamental plant in Western Europe. This species should be used in green spaces in Serbia more often. *B. darwinii* can be propagated by seed, but it has endogenous seed dormancy. For this reason, we decided to investigate which chilling treatment will be effective in breaking its dormancy. The seeds used in our experminets were collected in Hyde Park in London, and after maceration they were cold stratified in perlite or in bags without a substrate for 3, 4 and 5 months. The parameters of seed germination were determined according to the ISTA rules. The best results were achieved with the seeds cold stratified in perlite for 4 and 5 months, whose germination rate was 73.5% and 73.0% respectively. However, seeds stratified for 5 months in perlite had a higher germination energy (69.0%) compared with seeds stratified for 4 months (37.0%). There are indications that germination rate can be improved with combination of warm and cold stratification, so additional research should be conducted.

Keywords: *Darwin's barberry, seed dormancy, cold stratification, generative propagation.*

EFFECT OF GIBBERELLIC ACID AND POTASSIUM NITRATE ON THE *SEED GERMINATION* OF *BLUE-EYED GRASS (*SISYRINCHIUM ANGUSTIFOLIUM MILL.)

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Abstract

Propagation of *blue-eyed grass* (*Sisyrinchium angustifolium* Mill.) is difficult due to its embryo dormancy. The aim of this research is to establish a suitable method of breaking seed dormancy of this species. The seeds used in this experiment were collected in a private garden in Belgrade, and the effect of different treatments on seed germination was evaluated. These treatments included the application of different concentrations (10^{-3} M, 10^{-4} M, 10^{-5} M) of GA_3 (gibberellic acid), application of 0.2% KNO_3 (potassium nitrate), cold stratification (1 or 2 months at 3-5^{o}C) and combinations of these treatments. The obtained results showed that S. angustifolium *requires cold pretreatment for germination, but germination percentage can be considerably improved by treating the seeds with* KNO_3 or GA_3. Data were statistically analysed and the best results were achieved with the seeds treated with 10^{-3} M or 10^{-4} M GA_3 and cold stratified for 2 months (79% and 70% germination rate, respectively).

Keywords: Blue-eyed grass *(Sisyrinchium angustifolium* MILL.), *cold stratification, GA_3, KNO_3,*

EFFECT OF OPTIMIZED REGULATED DEFICIT IRRIGATION ON THE PROFITABILITY OF PURPLE GARLIC IN A SEMIARID REGION OF SPAIN

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Abstract

In the semiarid areas of Spain the main limitation factor for agriculture is the availability of irrigation water. MOPECO (model for the economic optimization of the irrigation water) aims to maximize the profitability of irrigated farms through a more efficient use of available irrigation water and cultivable area. For reaching this objective, the model combines the "optimized regulated deficit irrigation" (ORDI) methodology with the typical meteorological year. A two years experiment (2015 and 2016) was conducted in Albacete in order to determine the effect of ORDI on the yield, quality and profitability of the purple garlic cultivar "Morado de Las Pedroñeras". The crop received five irrigation doses: Non deficit (control), 100% of typical irrigation requirements (IR) of the crop in the area, 90% IR, 80% IR, and 70% IR. As expected, yield increased with the volume of irrigation water supplied to the crop (from 8256 to 10055 kg ha^{-1} of 70% IR and Non deficit treatments, respectively). Nevertheless, the water productivity in economic terms was higher for the ORDI treatments (from 3.34 to 5.53 € m^{-3} of Non deficit and 70% IR treatments, respectively). In consequence, for a similar volume of available irrigation water, producers can increase the profitability of their farms by cropping a higher area (that cannot be irrigated due to the lack of water) applying a volume of water per hectare (managed by using the ORDI methodology) lower than the irrigation requirements of the crop.

Keywords: *Water productivity, MOPECO, crop modelling, ORDI, typical meteorological year.*

INVESTIGATION OF RELATION BETWEEN SOME PHYSIOLOGICAL PARAMETERS AND YIELD IN MAIZE (ZEA MAYS L.)

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Abstract

This study was carried out to determine relationships between physiological characteristics and yield of some maize varieties. The research was laid out as randomized complete block design with four replications in 2015 maize growing season. Six grain maize varieties which have different properties (PR31D24, Kalipso, 70MAY82, Suerto, P1921, DKC6724) were used as material. According to the obtained results, there were significant differences among varieties in terms of pre-flowering, flowering, post-flowering period's chlorophyll contents (SPAD readings), leaf area index (LAI) and stomatal conductance. The P1921 variety had highest yield by 15181.0 kg ha^{-1}. The correlation analysis showed that there were significant and positive correlations among grain yield and flowering period's chlorophyll content. It was determined that there were interrelations between physiological and morphological parameters and these interrelations affects grain yield; in addition, the results indicated that chlorophyll content can be used as selection criteria in maize breeding programs.

Key words: *Adaptation, physiology, maize, quality, yield.*

PEST SPECIES IN CHESTNUT GROWING AREAS OF IZMIR AND MANISA PROVINCES AND THEIR ECONOMIC IMPORTANCE

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Abstract

The European chestnut (*Castanea sativa* Miller) is a native species of Turkey that grows in the coastal Black Sea, Marmara and Aegean regions and has a great economic importance. Insect pests cause significant economic yield losses in the chestnut. This study was carried out in order to determine the pest species in chestnut areas of Izmir and Manisa provinces of Turkey in the period 2012-2014 and their economic importance. Sampling was performed in 52 chestnut orchards in total of 4 districts. The knocking method, visual checking and pheromone traps were used in the determination of the species. As a result of the study on the most widespread and most common pest species, the following species were found to be economically significant: *Stephanitis pyri* F. (Het.: Tingidae), *Lachmus roboris* L. (Hem.: Lachnidae), *Alebra albostriella* (Fall.), *Zyginella pulchra* Low (Hem.: Cicadellidae) in the leaves, *Parthenolecanium rufulum* (Cockerell) (Hem.: Coccidae) in the leaves and shoots, *Cydia splendana* (Hbn.), *Pammene fasciana* L. (Lep.: Tortricidae) and *Curculio elephas* Gyll. (Col.: Curculionidae) causing damage to the fruit and *Coccus coccus* L. (Lep.:Coccidae), *Synanthedon vespiformis* L. (Lep.: Aegeridae), *Morinus funereus* Mulsantand, *Prionus basicanus* Fairmaire (Col.: Cerambycidae) causing damage to the woody tissues. It was observed that chestnut cancer (*Cryphonectria parasitica* (Murrill) Barr) was also common in the areas where the study was conducted. It was determined that chestnut cancer was widespread and tree dryness was common in the chestnut areas where woody tissue-harming pests, such as *C. coccus* and *S. vespiformis* were common. *C. splendana* and *C. elephas* usually cause harm in orchards that are at lower elevations and close to settlements. They also cause a significant labour loss as a result of observing wormy fruits at chestnut enterprises. Thus, *C. coccus*, *S. vespiformis*, *C. splendana*, *C. elephas* species are the most significant species that cause economic loss. Alternative control methods against these pests must be developed in the near future.

Keywords: *Chestnut, pests, economic importance, Turkey.*

DETERMINATION OF YIELD AND TECHNOLOGICAL PROPERTIES OF EARLY MATURING COTTON GENOTYPES

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Abstract

The objective of this study was to determine yield and quality parameters of some early maturing cotton genotypes by comparing them with control cultivars. The study was carried out at the GAP International Agricultural Research and Training Center during 2013 and 2014 cotton growing season. Five advanced lines developed by breeding program and two control varieties namely Stoneville 468 and Fantom were used as material. The experiment was laid out as randomized complete block design with four replications. The results of statistical analysis indicated that there were significant differences among genotypes for investigated characteristics in terms of first picking percentage, fiber fineness, fiber strength, elongation, uniformity and short fiber index. There were significant differences between years for seed cotton yield, ginning percentage, first picking percentage, lint yield, fiber length, fiber strength, elongation, uniformity and short fiber index. All investigated characteristics had high values in 2013 except fiber length and fiber strength. Genotype x year interaction was significantly different only for fiber fineness. The results of research showed that the line coded as 9/8 had highest seed cotton yield, lint yield and first picking percentage, while 19/3, 9/1 and 9/8 lines had highest technological properties.

Keywords: *Cotton, earliness, maturity, yield.*

EFFECTS OF POLLEN CONTAMINATION AND KERNEL WEIGHT ON KERNEL STRUCTURE OF MAIZE IN OPEN AND SELF POLLINATION TREATMENTS

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Abstract

In small plot experiments conducted in maize, the mostly used pollination methods are open and self-pollination treatments. Comparative studies using these treatments are abundant in scientific literature; however studies on the effect of cross pollination and kernel weight on kernel biochemical properties in different treatments are limited. In this study, we conducted a comparative experiment to investigate the effect of pollen contamination and mean kernel weight on kernel biochemical composition of ten different maize genotypes by using two different pollination methods.Open and self-pollination treatments were applied as pollination methods. Eight different traits; kernel weight, cross pollination rate, protein, oil, carbohydrate, oleic acid linoleic acid and carotenoid content were measured. Regression analyses were performed to understand the effects of cross pollination and mean kernel weight on biochemical constituents of maize kernel in different treatments. Results showed that the major biochemical traits, such as protein, oil and carbohydrate content were significantly affected by pollen contamination but minor traits were not. When data were combined (n=60) the effect of pollen contamination in different treatments was not clearly understood. When data (n=30) of each treatment were separately analyzed, it was found that cross pollination rate had significant effect on the most of biochemical constituents in open pollination. Overall, results suggested that pollen contamination had an effect on major biochemical traits in maize and hand pollination could be used for preventing of unwanted effect of pollen contamination in small plot experiments. However, it should be considered that the effects of hand pollination on kernel weight affect the some biochemical traits in maize.

Keywords: *Xenia, quality traits, Zea mays, Pollen contamination.*

PRODUCTION POTENTIAL AND DEVELOPMENT OPPORTUNITIES OF HAZELNUT (*CORYLUS AVELLANA* L.) IN TURKEY

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Abstract

Hazelnut (*Corylus avellana* L.) is one of the oldest cultivated agricultural products. Anatolia is the gene centre of hazelnut. The richness of our country on genetic variation of this species provides facility for achievement in breeding studies in a short period of time. Because this fruit is cultivated on some regions of Anatolia, it is extremely important to develop cultivars proper for some regions. Turkey is the largest producer and exporter of hazelnut in the world. The world has 713.451 tons of total hazelnut production. According to 2015 statistics Turkey has 646.000 tons of total hazelnut production. Considering the total hazelnut production by the Regions in Turkey, East Blacksea and Marmara regions rank first and second with 353.427 and 161.905 tons of hazelnut productions respectively as West Blacksea Region is the third with a production of 130.114 tons. Considering the total hazelnut production of the provinces in the our country, Ordu and Giresun provinces rank first and second with 200.938 and 105.023 tons of hazelnut productions respectively as Kütahya province comes last with a production of only 2 tons. In this study, through presenting the existing status of the hazelnut production of Turkey, it was aimed to increase the awareness and set light to decision makers for making use of and directing the existing potential in future plans of our country.

Key words: *Hazelnut, production potantial, development opportunities, Turkey.*

NUTRIENT CONTENT OF SOME SILAGE SORGHUM VARIETIES GROWN AS SECOND CROP UNDER IGDİR ECOLOGICAL CONDITION

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Abstract

The research was conducted to determine feed quality of three Sorghum varieties (Rox, Early sumac and Leoti) two Sorghum bicolor x Sorghum sudanense varieties (Nutri honey and Hayday) and one Sudan grass variety (Gozde 80) grown as second crop under Igdir ecological condition. This research was established according to randomized complete blocks experimental design with three replications. In this study, Crude protein (CP), Neutral detergent fiber (NDF), Acid detergent fiber (ADF), Acid detergent lignin (ADL), Dry matter digestibility (DMD), Digestible energy (DE), Metabolizable energy (ME), Dry matter intake (DMI), and Relative feed value (RFV) of sorghum varieties was determined. According to results; The CP, NDF, ADF, ADL, DMD, DE, ME, DMI and RFV contents of some silage sorghum varieties ranged from 5.93 to 8.88%, 51.98 to 65.64%, 27.94 to 40.44%, 4.73 to 7.07%, 57.39 to 67.13%, 2.72 to 3.14 Mcal kg-1, 2.23 to 2.58 Mcal kg-1, 1.83 to 2.31%, 81.82 to 120.16, respectively. The highest DMD (67.13%), DE (3.14 Mcal kg-1), ME (2.58 Mcal kg-1), DMI (2.31%) and RFV (120.16), and the lowest NDF content (51.98%), ADF (27.94%) and ADL (4.73%) were determined in Rox variety. In the present study, it was found that Rox variety was suitable for animal feeding in terms of all desirable quality parameters examined except for CP. According to the results, Rox variety was suggested as second crop under Igdir province and similar ecological conditions.

Key words: *Sorghum species and hybrids, second crop, feed quality, Igdir*.

INFLUENCE COLLOIDAL SOLUTIONS OF NANOMOLYBDENUM ON THE EFFICIENCY OF SYMBIOTIC NITROGEN FIXATION IN LEGUMES (PEA, CHICKPEA)

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Abstract

The strategic goal to the solving problem of dietary and fodder protein and restoring fertility of Ukrainian soils is optimal expansion of sowing areas traditional and non-traditional legumes. Creation of materials which are easily assimilated by living creatures and not harmful to the environment is one of the important issues of modern nanotechnologies. The aim of our study was the comparative evaluation of pre-sowing treatment with nanomolybdenum and microbiological preparation for impact on the efficiency of symbiotic nitrogen fixation in pea and chickpea plants. Field studies were conducted in the separated subdivision of the National University of Life and Environmental Sciences of Ukraine «Agronomic Experiment Station» on the typical black soils in the northern part of Forest Steppe of Ukraine. It was study of the influence of biological preparations on the nitrogen fixation capacity of pea (var. Tsarevych, Deviz) and chickpea plants (var. Rozanna, Triumf). The nitrogenase activity of the nodules in the root system of legumes was determined by acetylene-ethylene method. The efficiency of legume-rhizobia symbiosis depends on the number and virulence of symbiotic bacteria, which makes fixation of atmospheric nitrogen. Pre-sowing seeds treatment by strain of microorganisms enhances the quantitative and qualitative increase in the efficiency of the legume-rhizobia symbiosis. Using colloidal solution of molybdenum without seed inoculation also influences the number and diversity of rhizobia in the soil. Number, weight and symbiotic activity of nodules of pea and chickpea plants varied depending on the weather conditions. In the flowering stage the effects from pre-sowing treatment by bacterial inoculants and molybdenum solutions was most notable – the number of nodules was greater at 50-150 % compared with control, using inoculation this figure was higher at 8-9 %.

Keywords: *Pea, chickpea, nitrogenase activity, colloidal solutions of nanomolybdenum.*

SAFFLOWER PRODUCTIVITY DEPENDING ON SEED TREATMENT BY AKM PLANT GROWTH REGULATOR AND LEVEL OF MINERAL NUTRITION

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Abstract

Extremely uneven distribution of moisture during the growing season dramatically increases not only the risk of safflower seeds yield reduction, but its quality as well. One of the main reserves of solving this problem is the dose of fertilizers, particularly nitrogen, and use of plant growth regulators (PGRs) in the critical phases of plant development. It is the optimum combination of these factors that is a significant reserve for increasing yield stability and quality of safflower seeds. The aim of the research was to identify the impact of AKM PGR on productivity of safflower plants at different levels of mineral fertilization. The results of the study on the impact of the AKM plant growth regulator on growth, development and yield formation of safflower in low moisture conditions of Southern Steppe of Ukraine are presented. Optimal concentration of AKM PGR (0.0015 g/l) was determined. Seeds, processed by AKM PGR, had laboratory germination 5.7 % higher than in the control. In 2016, the safflower plant height for all variants was higher than this figure in the other years of the study. This is because HTC in 2016 for the period BBCH 00-39 was higher than in 2015 by 1.4 times. Therefore 1 anthodium formed on average 13.2 to 21.6 seeds. AKM PGR increased, compared to control, both weight of seeds in 1 anthodium, and the number of anthodia during the study years, thanks to anti-stress properties of AKM. This preparation significantly affected yield only in unfavourable years, and the impact of fertilizers was insignificant. The AKM plant growth regulator is recommended for the use on safflower in 0.0015 g/l concentration.

Keywords*: Safflower, productivity, plant growth regulator, growth and development of the plants, stress resistance.*

EFFECT OF HERBICIDE TRIBENURON- METHYL AND 2,4D-DICHLORFENOXIACETIC ACID IN PIGMENTS SYNTHESIS AT LOCAL WHEAT CULTIVAR OF ALBANIA

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Abstract

One important local cultivar of bread wheat (*Triticum aestivum* L.) donated from the Seed Bank of Korca District, Albania, named Pobjeda was investigated for the photosynthetic pigment synthesis under the effect of treatment with herbicide tribenuron- methyl, 2,4-D-dichlorfenoxiacetic acid, and a combination of both. Seeds were planted in pots (4 paralels) in a normal temperature regime and allowed to grow for 21 days before treatment with tribenuron-methyl and 30 days before treatment with 2,4D-dichlorfenoxiacetic acid, and the combination of both, following the instructions of herbicide producers. Pigments were extracted following a standart DMSO protocol from leaf samples collected after 7-14-21 days from the treatment with tribenuron-methyl; after 1hr-5 days-7days from the treatment with 2,4D-dichlorfenoxiacetic acid; and 1hr-5days-7days-14days-21days after the treatment with the combination of both herbicides. Results on pigments analysis show that the chlorophyll and carotenoid synthesis is reduced from the first to the third week after treatment (by 35% and 26.4%, respectively), which is the period of known effect of the tribenuron-methyl, however there are differences in the reduction rate.Pigment synthesis at plants treated with 2,4-D gets reduced from the first hour until one week after treatment for chlorophylls and carotenoids (by 56.9% and 53.9%), even though the expected impact should have been finished within 5 days.Plants treated with the combination of both herbicides display a reduction of pigment synthesis from the first hr after treatment until the end of the second week (53.1% and 40%), and increase slowly during the third week (to 16,5% and 17.8%). The evaluation of plants height during 45 days (anthesis) from the germination, included period of treatments, show that plants treated with tribenuron have reduced height by 9.7%, those treated with 2,4-D with 1.9% and those treated with the combination of herbicide by 10.5%, compared to control plants. In conclusion, the herbicide treatment affects the photosynthesis for cultivar Pobjeda through the pigment synthesis and height reduction, as measured until the anthesis phase, and a careful dosage of herbicides should be tested in order to find the appropriate treatment for a better yield.

Keywords: *Herbicide, photosynthetic pigments, anthesis.*

USING CARBON ISOTOPE DISCRIMINATION TO EVALUATE VETCHES UNDER DROUGHT CONDITION

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Abstract

As drought is a major constraint affecting Algerian agricultural production, it is a universal problem that has affected all countries and the various surveys on climate change suggest that there would be a high probability of increasing temperature and worsening rainfall deficit. This situation leads us to reflect on ways of improving agricultural production (grasses and fodder crops, in particular Vetches) under more severe water constraints. Given the complementarity research themes, three experiments were carried out in different water situations to choose the most suitable ecotypes. The work carried out aims to acquire a better knowledge of the production of forages in a context of climatic changes. The main objective of our work was to evaluate the behavior of the genus Vicia under semi-arid conditions in the central region of Eastern upland of Algeria and to determine the relationship between Carbon isotope discrimination considered as a criterion for selecting adapted vetches ecotype put under water stress.

Keywords: *Vetches ecotypes, carbon isotope discrimination, dry matter, drought, selection.*

VALORIZATION OF CALICOTOME VILLOSA ROOTS NATIVE TO ALGERIA AND ESTIMATION OF THEIR ANTIFUNGAL ACTIVITY

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Abstract

Calicotome villosa is an endemic plant belonging to flowering plants in the legume family, Fabaceae. The aim of this study was to determine the antifungal effectiveness of a mixture prepared from ash samples using an incineration process of Calicotome villosa roots and bovine butter (butyrate matter) against two skin fungi pathogens in different conditions. Compositional and structural studies of Calicotome villosa ash were carried out by energy dispersive X-ray spectroscopy (EDX) and scanning electronic microscopy (SEM). The antifungal assay was effectuated by the direct contact method. The heterogeneity of the composition indicated the presence of the nanoparticles almost iron oxide and several mineral elements, including especially calcium, silicon and magnesium. The results emphasized that the effect of the mixture studied was fungicidal with 100% mycelia growth elimination. These results gave a promising perspective for the production of drugs against dermatophytes proliferation. However, the mechanisms and processes involved require more research. The combination mineral/fat leads to a very powerful antifungal activity complex. It is important to note that this preparation based on natural substances is likely proposed to find applications in place of ointments containing synthetic products.

Keywords: *Calicotome villosa, roots ash, Bovine butter, antibacterial activity, Antifungal activity.*

STUDIES ON THE ANTIOXIDANT ACTIVITY OF DIFFERENT SOLVENT EXTRACTS OF *AMMI VISNAGA* FROM ALGERIA

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Abstract

Plants have been used since ancient times by primitive societies due to therapeutic and psycho therapeutic benefits among other healing properties. Phenolic compounds have several biological effects such as anti-inflammatory, bactericidal and antioxidant properties due to their ability to neutralize free radicals. As a member of the Apiaceae plant family the *Ammi* genus is represented by two species. This genus is deemed to accumulate different metabolites. In this study, *Ammi visnaga* was extracted with chloroform and methanol at room condition, filtered and evaporated under vacuum. Chloroform and methanol extracts were prepared to determine their phenolic and flavonoid component and the antioxidant activity of extracts was performed by $DPPH^{\cdot}$, β carotene linoleic acid, $ABTS^{\cdot+}$scavenging and cupric-reducing antioxidant capacity (CUPRAC). The highest total phenolic and flavonoid compounds were established in methanol (61TAE mg/g) and (34.01 QE mg/g). In all concentrations, methanol extract of *Ammi visnaga* exhibited the highest activity all antioxidant tests, this extract possessed good antioxidant with IC_{50}183µg/ml, 17.56µg/ml, 23.82µg/ml and A_0 = 70.05µg/ml.

Key words: *Antioxidant activity, Ammi visnaga, plant.*

INTERCROPPING CHICKPEA AND DURUM WHEAT FACILITATES PHOSPHORUS AND NITROGEN ACQUISITION THROUGH SYMBIOSIS IN N-DEFICIENT, ALKALINE SOIL

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Abstract

It has recently been shown that there is a beneficial interaction between cereals and N_2-fixing legumes resulting in increased P acquisition but little is still known about the N-P interactions in the rhizosphere that affect N and P acquisition. Rhizosphere acidification caused by the N_2-fixing activity of legumes is one of the mechanisms thought to improve N and P acquisition in cereal-legume intercropping in neutral to alkaline soils. Plant growth, N and P uptake and nitrogen nutrition index, rhizosphere pH and soil respiration were investigated in the field. Cereals (durum wheat) and legumes (chickpea) were cultivated as intercrops or as sole crops in rotation over a two year period. Both the above-ground biomass and grain yield, and consequently the amount of N taken up by intercropped durum wheat, increased significantly compared to sole cropping in the first year and after the chickpea. However, intercropping had no effect on P uptake for either species. N_2 fixation increased when the chickpea was intercropped or grown after durum wheat. A reduction in pH and root respiration in the chickpea rhizosphere were the root-induced processes that improved N and P availability for durum wheat and the chickpea grown as intercrops and the chickpea grown after durum wheat. The major finding in this work is that the chickpea intercropped with durum wheat considerably increased rhizosphere N and P availability and N concentration in durum wheat, whereas, for the chickpea, both N nutrition and acquisition were higher in intercropping systems only with respect to the first year of sole cropping. The results suggested that interactions improving P-N acquisition in cereal-legume intercropping depend largely on N deficiency.

Key words: *Phosphorus, N_2-fixation, facilitation, intercropping, rotation.*

DURUM WHEAT EVALUATION USING CARBON ISOTOPE DISCRIMINATION AND NUMERICAL ANALYSIS OF IMAGE FOR LEAF SENESCENCE

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Abstract

Drought is a wide-spread problem seriously influencing durum wheat (Triticum durum Desf.) production and quality, but development of resistant cultivars is hampered by the lack of effective selection criteria. The overall objective of this study was to investigate if leaf senescence can assist in breeding wheat for drought tolerance under such conditions. Specific objectives included: (i) to investigate the relationship leaf senescence and grain yield under contrasting climatic conditions with special reference to drought (ii) to identify lines varying in Δ (Carbon Isotope Discrimination) in wheat breeding programs in Algeria. Senescence was also estimated by following the decrease in chlorophyll concentration, using a SPAD-502 portable chlorophyll meter which measures leaf transmittance at red (650 nm) and near infrared (940 nm) wavelengths. Measurements were done on the same leaf used for Numerical Image Analysis measurements, at five dates (148.4, 188.2, 271.0, 352.8 and 443.8°C from anthesis stage). Some durum wheat genotypes from ICARDA and CIMMYT are studied. Lower Grain Yield and higher senescence rates in season 1 compared to season 2 may be attributed to climatic conditions (rainfall and temperature). Sharp increase in temperature during grain filling stage in season 1 is likely to have accelerated senescence. Lower grain yield is probably the consequence of a lower grain setting caused by freezing at heading and drought and high temperatures around anthesis. Highly significant effects of genotype, season and genotype x season were found on leaf and grain carbon isotope discrimination.

Key Words: *Durum wheat, carbon isotope discrimination, leaf senescence, Algeria.*

EVALUATION OF METHODS AND TIMING FERTILIZER APPLICATION ON *AMARANTHUS CRUENTUS*'S AGRONOMIC PERFORMANCES IN BENIN

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Abstract

An on-station trial was carried out on National Agricultural Research Institute of Benin (INRAB), Northern Research Center from May to July 2016 to assess methods and timing application of fertilizer micro-dosingon growth and yield response of *Amaranthus cruentus*, one of most consumed traditional leafy vegetable (TLVs) in Benin. Three factors: urea-N rates (0; 20; 40; 60 and 80 $kg.ha^{-1}$ corresponding to D0; D20; D40; D60 and D80, respectively), fertilizertiming application (0 and 14 days after transplanting) and application methods (hill, strip and foliar application after urea dilution in water) were tested in a randomized complete block with four replications. All plots except D80, received $5t/ha^{-1}$ of manure in plots preparation. Growth parameters (plant height, number of leaves, fresh matter produced per plant, leave area index) and vegetable yield were collected and submitted to an analysis of variance under Genstat Discovery 2 software. Results showed that D60 significantly improved growth parameters monitored and average fresh vegetable yield compared to the others tested rates. This urea-N rateproduced on average 25465.85 kg/ha^{-1} of fresh vegetable (15% of dry matter) with an improvement of 96; 56; 30 and 247% compared to D0, D20, D40 and D80, respectively. However, urea application timing and methods had no significant effect on growth and vegetable yield. A quadratic yield response ($y = -7.154x^2+561.721x+11011.785$) was found for different urea-N rates but the trend was not significant (R^2=62%). Fertilizer micro-dosing technology reduces fertilizers rates applied to TLVs and farmers can improve their incomes by reducing production costs.

Keywords: *Fertilizer micro-dosing technology, traditional leafy vegetables, Amaranthus cruentus, urea-N rates, Benin.*

EFFECT OF NUTRIENT MANAGEMENT ON SOIL WATER BALANCE AND AFRICAN EGGPLANT PERFORMANCE IN BENIN

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Abstract

Some experiments have been conducted during the 2015 dry season and 2016 rainy season in the northern Benin to study the effect of fertilizer microdosing technology on soil water balance and African eggplant's water use efficiency. The trials consisted of four replications in randomized complete block. Five urea-N levels (0, 20, 40, 60 and 80 kg/ha) and two levels (0 and 14 days after planting) of timing of fertilizer application were compared. All plot received 5t/ha of manure except 80kg/ha urea-N rate. During the dry season trial, half of Urea-N rates were tested. Soil water storage (s) and Crop evapotranspiration (ETCrop) were both markedly affected by weather conditions. For both variables, no significant ($p < 0.05$) differences were found between treatments. S was on average about 57mm/week during the dry season and up to 95 mm/week during the rainy season. The average weekly ETCrop was about 60 mm during the rainy season, but reached 69 mm during the dry season. In rainy season, depending of Urea-N level, 5 to 9% of the water input was lost by drainage. Fresh and dry biomass water use efficiencies (WUE_f and WUE_d, respectively) were positively affected by Urea-N supply in rainy season. The highest WUE_f (34 kg/ha/mm) and WUE_d (4.6 kg/ha/mm) were achieved by 60 kg Urea-N/ha, corresponding at an improvement of WUE_f and WUE_d by 36% and 28% as compared to 0 kg Urea-N/ha, respectively.

Keywords: *Water use efficiency, Solanum macrocarpon, Water balance, fertilizer Microdosing.*

INFLUENCE OF GRASS ESTABLISHMENT WITH SOME LEGUME SPECIES ON THE BIOCHEMICAL COMPOSITION OF 'BLACK SATIN' BLACKBERRY FRUITS

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Abstract

Blackberry is one of the main berry crops. It is not particularly demanding on soil and climate conditions. Foothill regions are suitable area for its cultivation, where plants develop to a large extent their biological and economic potential. The experiment was conducted during the period 2014-2016 in a plantation of the Research Institute of Mountain Stockbreeding and Agriculture (Bulgaria) at altitude of 400 m on grey forest soils. The experimental setting consists of interrow grass cover with common bird's-foot-trefoil, bird's-foot-trefoil of Aegean region and vetch. The influence of grass cover on some indicators of the biochemical composition and flowering characteristics of fruits was studied of 'Black Satin' blackberry cultivars. Higher values were registered in the content of anthocyanins and pectin. The grass cover with bird's-foot-trefoil and vetch had no influence on the colour characteristics of fruits. There were no significant differences in relation to the average weight of different fruit variants.

Keywords: *Blackberries, cultivars, chemical composition, fruit weight.*

INFLUENCE OF THE PROPAGATION TERM ON GROWTH OF ADRIATIC IRIS

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Abstract

Many of the native, wild species have a potential for use in ornamental horticulture. Iris adriatica Trinajstić ex Mitić is a very attractive perennial, due to its dwarf growth habit and beautiful, decorative flowers. It represents still untapped source in ornamental horticulture and is thus of great potential value for the enrichment of floriculture market. For introduction in cultivation, it is necessary to determine the optimal method and time of plant propagation, along with other technological parameters. Vegetative propagation is often used in nursery production, since it is not time consuming and provides a uniform plant material. In this work, propagation of Iris adriatica was performed by dividing of rhizomes. Two thirds of the rhizomes were planted below ground. Propagation was done in the first decade of June and in the first decade of August. In both cases, 160 mother plants were used, that is a total of 320 plants. During the experiment, plant height and number of shoots and leaves per plant were recorded. The results showed that the optimal time for propagation of Iris adriatica by dividing of the rhizomes is the first decade of June. However, the rate of propagation was low and unsatisfactory and is thus not suitable for mass plant production.

Keywords: *Iris adriatica Trinajstić ex Mitić, perennial, rhizome, vegetative propagation.*

EFFECT OF SOWING METHODS AND THREE SEEDING RATES ON WHEAT YIELD AND ITS COMPONENTS

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Abstract

Two field experiments were conducted at the farm of Kuotor - el- gGharbia governorate (Egypt) during 2012/2013 and 2013/2014 growing seasons to study the effect of five sowing methods: khadir method, afir method (the traditional method applied by most farmers), drilling method in rows in flat land, beds method and pyramid (e and a) method) and three seeding rates (96, 144 and 192 kg seeds/ha) on yield and yield components of wheat. Pyramid sowing method was better for growing wheat plants and gradually increased grain yield/ha than khadir, afir, drilling and beds method (6.54, 3.76, 3.17 and 2.57%) in the first and (4.33, 5.55, 2.55 and 2.55 %) in the second seasons, respectively. The interactions between pyramid and seed rates 144 kg/ha recorded the highest yield and its components as compared with khadir method.

Keywords: *Wheat, sowing methods, grain yield and its components and seeding rates.*

RESPONSE OF BARLEY QUALITY TRAITS, YIELD AND ANTIOXIDANT ENZYMES TO WATER-STRESS AND CHEMICAL INDUCERS

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Abstract

Two field experiments were carried out in order to investigate the effect of chemical inducers [benzothiadiazole 0.9 mM L^{-1}, oxalic acid 1.0 mM L^{-1}, salicylic acid 0.2 mM L^{-1}] on physiological and technological traits as well as on yields and antioxidant enzyme activities of barley grown under abiotic stress (i.e. water surplus and deficit conditions). Results showed that relative water content, leaf area, chlorophyll and yield as well as technological properties of barley were improved with chemical inducers application under water surplus and water-stress conditions. Antioxidant enzymes activity (i.e. catalase and peroxidase) were significantly increased in barley grown under water-stress and treated with chemical inducers. Yield and related parameters of barley presented also significant decrease under water-stress treatment, while chemical inducers application enhanced the yield-related traits. Starch and protein contents were higher in plants treated with salicylic acid than in untreated plants when water-stress was applied. In conclusion, results show that chemical inducers application have a positive interaction and synergetic influence and should be suggested to improve plant growth, yield and technological properties of water stressed barley. Salicylic acid application was better than oxalic acid and benzothiadiazole in terms of plant growth and yield improvement.

Keywords: *Antioxidant enzymes, drought stress, Hordeum vulgare L., quality, yield.*

WHEAT GROWTH, WATER AND NITROGEN USE EFFICIENCY IN A SYSTEM OF DRIP IRRIGATION IN ARID REGIONS

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Abstract

For crop production in arid and semi-arid regions there is a limited amount of irrigation water i. Modern irrigation systems, such as drip irrigation, are widely used in Egypt and especially in countries with limited irrigation resources. Drip irrigation enables efficient use of limited water with increased water use efficiency (WUE). The application of nitrogen (N) to wheat is needed to ensure enough amounts of N throughout the growing season having in mind how important N is in promoting both vegetative and reproductive growth. A field experiment was carried out during season 2010 and 2011 at a private farm on a newly reclaimed sandy soil in El-Sadat district El- monofia governorate (Egypt). The experiment was conducted to study the effect of four rates of nitrogen fertilizers (i.e., 0, 40, 60 and 100 kg N /fed.), two types of N fertilizer [urea 33.5% N) or urea-formaldehyde (38% N)] combined with two irrigation regimes at different soil moisture depletion (FC) (1I =80% of FC or 2I =40% of FC) on wheat crop irrigated by drip method. The nitrogen fertilizer containing urea was injected into irrigation water with an injection pump. The researchers determined the amounts of available nitrogen in soil depths 0-20, 20-40 and 40-80, nitrogen uptake by straw and grain yield, as well as grain nitrogen recovery (GNR). The results showed that use of 1I water t through drip irrigation along with 100 kg N /fed. from two nitrogen sources resulted in the highest shoot and grain yield, the highest nitrogen content and nitrogen use efficiency, when compared with the other nitrogen rates and regimes of irrigation. Also, WUE increased with irrigation 1I and nitrogen levels and reached the highest values at 100 kg N fed. as urea fertigation compared with urea-formaldehyde.

Key words: *Levels of irrigation, urea-formaldhyde, water use efficiency, nitrogen fertilizer fe=0.42 ha*

COMBINING ABILITY ANALYSIS FOR EARLINESS, YIELD AND ITS COMPONENTS IN 7X7 HALF DIALLEL CROSS IN BREAD WHEAT (*TRITICUM AESTIVUM* L.)

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Abstract

Field experiments were carried out at the experimental farm of El-Gemmeiza Agricultural Research station, El-Garbia Governorate, Egypt during the two growing seasons of 2008/09 and 2009/10. Seven genotypes i.e., Koru, Gemmeiza 9, IBTA, Sakha 93, Roland, Rumorosa and Athos were crossed in half-diallel mating design in the first season. In the second season, the 28 obtained genotypes were evaluated in a randomized complete blocks design in three replications. Mean squares of GCA and SCA were highly significant for all traits, indicating the presence of both additive and non-additive type of gene action. The ratio of GCA/SCA mean squares were more than unity for all traits, indicating that these traits were predominantly controlled by additive and additive x additive gene effects. The parental genotypes; Koru, Roland, Rumorosa and Athos were found to be good combiners for most earliness attributes i.e, days to heading, days to maturity, grain filling period and grain filling rate. Sakha 93, Gemmeiza 9 and Roland had highly significant positive estimated of ($\hat{g}_i$) for no. of spikes/plant, no. of grains/spike, 1000-grain weight and grain yield/plant. Significant inter and intera-allelic interaction in negative direction was found in the crosses; Koru x Gemmeiza 9 and Koru x Rumorosa for most earliness attributes; Gemmeiza 9 x Rumorosa for days to heading and grain filling rate; Gemmeiza 9 x Athos for days to maturity and grain filling rate and the cross; Rumorosa x Athos for days to heading and grain filling rate. On the other hand, the crosses; Sakha 93 x Athos , Roland x Rumorosa, IBTA x Sakha 93, Gemmeiza 9 x Rumorosa, Koru x Rumorosa and Koru x Gemmeiza 9 had significant ($\hat{S}ij$) in positive direction for grain yield and most of its components.

Keywords: *Half-dialle, general combining ability, specific combining ability.*

BIOCOMPETITIVE SOIL MICROBES FOR AGRICULTURAL PRODUCTIVITY

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Abstract

Microbes are the major components to improve soil fertility thereby increasing agricultural productivity. They are the agents of cycling of organic matter, nutrients and various bioprocesses in the soil. Although their activities are influenced by the physico-chemical properties of soil and ecological interactions within the biosphere, they do have evolutionary mechanism to overcome these problems. The roles of these soil microbes in the cycling of biological elements, recycling of wastes, and the bioremediation of environmental pollutants is relevant for sustainable development, particularly in developing countries. There is little/incomplete research conducted to quantify the beneficial relationships between soil microbial diversity, agricultural productivity, and ecosystem sustainability. Hence, soil microbes play a significant role in the development of human societies. Herein, in this review paper we will briefly highlight the biodiversity role of soil Microbes; cycling of nutrients, recycling of wastes, bioremediation of toxic substances and other agriculturally important biological elements that in one or other way elevate agricultural productivity.

Keywords: *Agricultural productivity, agro-ecological, bioprocesses, bioremediation, biosphere, microbes.*

AN ETHNO-VETERINARY BOTANICAL SURVEY OF MEDICINAL PLANTS AT DITA DISTRICT IN ETHIOPIA

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Abstract

Inclusive study with the aim of documenting traditional medicinal plants was carried out between January 2015 and December 2016 in 6 Kebeles across Dita woreda. Semi-structured questionnaires and interviews were administered to a total of 40 healers. Collections of data were based on the information supplied by the healers during the interview. Specimens of plants were collected in the field using photo that includes parts of plant as it was appropriate for taxonomic identification. Collected information included local, scientific and family names, type, diseases treated, parts and condition used, growth habit, preparation, administration, importance and habitat. The obtained data were analyzed through informants consensus factor (F_{IC}) to determine the homogeneity of informants knowledge on remedial plants, and the fidelity level (FL) to confirm the exclusivity of a species to treat a particular disease. Total of 74 different medicinal plant species were surveyed for both human and veterinary diseases. The composed plant species has been sorted under 27 families. Lamiaceae, Asteraceae, Poaceae and Rutaceae were dominant with 13, 9, 8 and 5 percentages, respectively. Of the medicinal plants reported, there were herbs (65%) followed by shrubs (20%) and trees (15%). Among collected medicinal plants 90% used leaf of the plants. Common treated diseases were abdominal diseases, "evil eye" parasitic and labor problems in case of human and anthrax and trypanosomiasis in case of animals. Chewing, chopping, crushing and squeezing were ways of preparation and taking medicine orally was common administration route. Wet conditions of the plants were more commonly used than dry conditions. The Ethnoveterinary in Dita woreda incorporates numerous of diverse botanical flora. Traditional knowledge is, however, currently threatened mainly due to acculturation and deforestation. Findings of this documentation study can be used as an ethnobotanical basis for selecting plants for conservation, phytochemical and pharmaceutical studies.

Key words: *Healers, consensus factor, fidelity level, ethnoveterinary and traditional knowledge.*

EFFECTS OF INTEGRATED NUTRIENT MANAGEMENT ON SOIL PHYSICO-CHEMICAL PROPERTIES AND GRAIN YIELD OF FOOD BARLEY (*HORDEUM VULGARE* L.) IN KAFFA ZONE, SOUTH-WESTERN ETHIOPIA

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Abstract

Low soil fertility is a major constraint for barley production in Kaffa Zone, south-western Ethiopia. Thus, a field experiment was conducted to assess the effects of integrated application of farmyard manure (FYM) and vermicompost (VC) with inorganic NP fertilizers on selected soil properties and grain yield of food barley (Hordeum vulgare L.). The study was carried out in Ghimbo and Adiyo during 2013 main cropping season. Fourteen treatments comprising combination of two rates (2.5 and 5 t ha^{-1}) of FYM and two rates (2.5 and 5 t ha^{-1}) of VC combined with three levels (25, 50 and 75%) of recommended rates of inorganic NP fertilizers with 100% recommended rate of inorganic NP (23 kg N ha^{-1} and 46 kg P_2O_5 ha^{-1}) and zero rates were laid out in a randomized complete block design with three replications. Results indicated that the application of 5 t FYM ha^{-1} in combination with 75% recommended rates of inorganic NP increased the organic carbon of the soil by 53.26 and 55.41% in Adiyo and Ghimbo, respectively, after crop harvest over the application of 100% recommended rate of inorganic NP. In general, the application of FYM in combination with different levels of recommended rates of inorganic NP increased total N, CEC, available P, available K and available water holding capacity, porosity, decreased bulk density over the application of 100% mineral NP alone and control. Results indicated that the combined application of 5 t ha^{-1} FYM and 75% recommended rate of NP increased yield of barley by 69.30% and 43.45% in Adiyo and by 66.86% and 45.49% in Ghimbo over control and the application of 100% recommended rate of inorganic NP, respectively. From the results of this study, it could be concluded that combined application of FYM and inorganic NP improved the soil physico-chemical properties, which might lead to enhanced and sustainable production of food barley in the study areas.

Keywords: *Farmyard manur, nitrogen, phosphorous, vermicompost.*

FARMYARD MANURE AND MINERAL NP IN KAFFA ZONE, SOUTHWESTERN ETHIOPIA

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Abstract

Barley (Hordeum vulgare L.) is among the most important small cereal crops produced in Kaffa Zone, southwestern Ethiopia. However, declining soil fertility as well as poor soil fertility management practices have limited the yields. Field experiment was conducted in Adiyo and Ghimbo districts, southwestern Ethiopia, to determine the effects of combined application of farmyard manure with inorganic NP and the influence of combined application of different rates of nitrogen and phosphorus fertilizers on growth, yield and yield components of two improved food barley varieties. The fertilizer treatments consisted of 2.5 t ha^{-1} FYM combined with 50 and 75% of recommended dose of NP fertilizer (RDF), 5 t ha^{-1} FYM combined with 25, 50 and 75% RDF, 46 kg N ha^{-1} + 69 kg P_2O_5 ha^{-1}, 69 kg N ha^{-1} + 46 kg P_2O_5 ha^{-1}, 69 kg N ha^{-1} + 69 kg P_2O_5 ha^{-1} , 92 kg N ha^{-1} + 23, 46 and 69 kg P_2O_5 ha^{-1}, 100% RDF (23 kg N ha^{-1} + 46 kg P_2O_5 ha^{-1}) and zero rates were laid out in a randomized complete block design with three replications in a factorial arrangement with two barley varieties called GABULA and Diribe. The highest number of productive tillers m^{-2} of 191.33 in Adiyo and 182 in Ghimbo were obtained for variety 'GABULA' when 5 t FYM ha^{-1} was applied with the combination of 75% recommended rate of inorganic NP. The main effect of fertilizer management indicated significantly highest grain yield of 2899 kg ha^{-1} and 2581 kg ha^{-1} and thousand grain weight of 42 g and 40.50 g in Adiyo and Ghimbo respectively, obtained from the application of 5 t ha^{-1} FYM in combination with 75% recommended rate of inorganic NP. Hence, it can be concluded that, the use of variety 'GABULA' and combined application of 5 t ha^{-1} FYM with 75% of recommended rates of inorganic NP can significantly increase food barley yield and yield components in the study areas.

Keywords: *Fertilizer rates, inorganic fertilizer, organic fertilizer, productivity.*

NODULATION, N AND P UPTAKE AS INFLUENCED BY PARTHENIUM (*PARTHENIUM HYSTEROPHORUS* L.) DENSITIES IN COMMON BEAN (*PHASEOLUS VULGARIS* L.) IN EASTERN ETHIOPIA

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Abstract

A field experiment was carried out at Haramaya University during 2010 cropping season to determine the impact of parthenium on nodulation, N and P uptake by parthenium and common bean. There were nine treatments comprising 0, 3, 6, 9, 12, 15, 18, 21 and 24 parthenium plants m^{-2}grown with common bean. The experiment was laid out in Randomized Complete Block Design with three replications. The result showed that parthenium population significantly influenced nodulation in common bean and N and P uptake by parthenium and common bean. The significantly higher number of total and effective nodules was recorded in common bean grown in the absence of competition more than in competition with parthenium. However, nodule dry weight was statistically at par between control, 3 and 6 parthenium plants/ m^2 and these treatments had significantly higher nodule dry weight/plant than the other parthenium densities. The N uptake by common bean grains and total aboveground plant was significantly higher in control than in competition with parthenium, while no significant difference in N uptake was obtained between control and 3 plants/ m^2 of parthenium, but both these treatments resulted in higher uptake than the other parthenium densities. The N uptake by parthenium increased with the increase in density up to 15 plants /m^2 and 12 and 15 parthenium plants/ m^2removed 85.93 and 91.42 kg N/ha which was significant over other densities. The common bean plant had higher uptake of N than parthenium up to 6 parthenium plants/m^2 whereas at higher densities it was lesser than parthenium. Like N, the P uptake by the crop was also adversely affected with increasing parthenium densities. But in contrast, P uptake by parthenium at all its densities was higher than in common bean.

Keywords: *Nitrogen, nodules, parthenium densities, phosphorus.*

GRAIN YIELD AND NP USE EFFICIENCY OF FOOD BARLEY (*HORDEUM VULGARE* L.) AS INFLUENCED BY N AND P FERTILIZER APPLICATION RATES IN KAFFA ZONE, SOUTHWESTERN ETHIOPIA

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Abstract

A field experiment was carried out to determine the effect of N and P fertilizers on grain yield and NP use efficiency. The experiment consisted of a factorial combination of five levels of N fertilizer with four levels of phosphorus fertilizer laid out in RCBD with three replications. The results indicated that the highest grain yield of barley and N uptake by total plant of 3433.00 and 15.66 kg ha^{-1}, respectively, in Adiyo and 3086.00 and 16.66 kg ha^{-1}, respectively, in Ghimbo were obtained from the combined use of 92 kg N $ha^{-1}$and 69 kg P_2O_5 ha^{-1}. The application of the highest N rate (92 kg ha^{-1}) combined with 23, 46 and 69 kg P_2O_5 ha^{-1}) in Adiyo and its application with 69 kg P_2O_5 ha^{-1} in Ghimbo resulted in grain N uptakes of 39.00 and 34.20 kg ha^{-1}, respectively. Similarly, the highest P uptake by the barley grain, straw, whole plant both in Adiyo and Ghimbo were obtained when 92 kg N ha^{-1} was applied with 69 kg P ha^{-1}. The highest physiological NP efficiency both in Adiyo and Ghimbo was obtained from the application of the 92 kg N ha^{-1} and 69 kg P_2O_5 ha^{-1}. Therefore, the application of 92 kg N ha^{-1} in combination with 69 kg P_2O_5 ha^{-1} can be recommended for the best productivity of barley crop in the study areas.

Keywords: *Apparent recovery, rate, uptake, physiological use efficiency.*

COMPETITIVE STUDY BETWEEN PARTHENIUM (*PARTHENIUM HYSTEROPHORUS* L.) AND COMMON BEAN (*PHASEOLUS VULGARIS* L.) IN EASTERN ETHIOPIA

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Abstract

A field experiment was carried out at Haramaya University research farm during 2010 cropping season to determine the competitive effect of Parthenium weed (Parthenium hysterophorus L.) on yield attributes and yield of common bean (Phaseolus vulgaris L.) and to assess the effect of Parthenium on nitrogen and phosphorus uptake by common bean. The competition between common bean and Parthenium was studied in additive experiment with nine treatments that have P. hysterophorus plant densities of 0, 3, 6, 9, 12, 15, 18, 21 and 24 m^{-2}. The experiment was laid out in Randomized Complete Block Design (RCBD) with three replications. The result showed that P. hysterophorus weed population significantly ($P<0.05$) influenced phenology, growth, nodulation, yield and yield attributes of common bean. P. hysterophorus parameters, such as plant height and dry biomass were also increased, whereas number of branches and collar diameter decreased with increasing weed densities. The days to flowering, physiological maturity and plant height of common bean increased, with increasing P. hysterophorus population. The crop stand, number of pods $plant^{-1}$, seeds $pod^{-1}$and hundred seed weight were adversely affected with increasing Parthenium density. In the absence of competition, common bean gave a yield of 2599.1 kg ha^{-1} that was reduced by 16.5 and 86.5 % in the presence of competition with 3 and 21 P. hysterophorus plants m^{-2}, respectively, although 3 and 6 plants m^{-2}, and 18, 21 and 24 plants m^{-2} had no significant difference in yield. From this finding it can be concluded that in the areas where parthenium weed infestation is even 3 plants m^{-2}, management strategy has to be formulated to contain the yield losses. The crop can smother parthenium weed, thus using this crop in such areas as an intercrop and/ or in rotation with cereals may help to curb the potential impact of parthenium on crop production. However, still there is need to verify the results, in addition to study the competition effect with varying common bean inter- and intra-row spacing with lower weed population.

Key words: *Competition, Parthenium (Parthenium hysterophorus L.), Common bean (Phaseolus vulgaris L.), yield and yield attributes.*

POTENTIAL IMPACTS OF CLIMATE CHANGE ON THE YIELD OF POTATO (*SOLANNIUM TUBERSUM* L.) UNDER VARIOUS CROP MANAGEMENT PRACTICES IN KAFFA ZONE, SOUTHWESTERN ETHIOPIA

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Abstract

The impacts of climate change on agricultural production in the world are of a significant concern. However, detail studies on the magnitude and direction of the impact and adaptation options that offset some of the impacts at country or lower scale are missing. This paper investigates the potential impacts of future climate on potato productivity using current crop management practices and also explores the role of new combination of crop management practices as adaptation options in Kaffa zone, Southwestern Ethiopia. Future daily rainfall and temperature data were downscaled from the average of four Global Circulation Models (GCMs) for the A2 and B1 emission scenarios using MarkSim weather generator whereas historical daily climate data were obtained from a weather station at the study site. Calibrated CERES-potato models embedded in the Decision Support System for Agrotechnology Transfer (DSSAT v. 4.5) were used to simulate the yield of the crop under the past and future climates. The result showed that future climate change had a tendency to increase the yield of potato. Higher yield change was more expected for the A2 than B1 emission scenario. Moreover, CO_2 fertilization would also increase the yield changes of the crop. On the other hand, anthesis and maturity period of crop would not be significantly affected due to climate change. Field level management practices would help to explore opportunities that improve the productivity of the crop. In this regard, a potato crop sown between the 1^{st} and 3^{rd} week of July with 150 kg N/ha and at 8.4 plants/m^2 would give the highest yield, 7.2-10.2 tons/ha. Therefore, agronomic practices such as change in sowing date, seed rate and N application levels could play a positive role in adapting potato to the future climate in the region.

Keywords: *Agronomic practices, CO_2 fertilization, DSSAT, emissions scenario, simulation.*

QUINOA'S EXPERIMENTATION AND PRODUCTION IN THE MEDITERRANEAN REGION

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Abstract

The climate of Mediterranean region will become drier and hotter in the next decades. In many places, we will note problems of soil salinity. A possible alternative to minimize the effects of climate change is to introduce new species with better tolerance to salt and drought stresses. One alternative is quinoa (*Chenopodium quinoa* Willd.), which was grown infield trials in several Mediterranean countries, to study the effects of drought and salinity on yield and other characters. The first experimentation of quinoa in the Mediterranean was in 1999 in Morocco and nowadays some countries like France or Spain have more than 3.000 hectares, and we can see other quinoa's trials in many countries, probably in more than 15 in the region. This research presents a review of quinoa experimentation in this area and presents the perspective of its development for the future.

Key words: *Quinoa, Mediterranean region, drought, salinity, yield.*

GENETIC VARIABILITY OF RADIATION USE EFFICIENCY IN WINTER WHEAT

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Abstract

Radiation interception and use efficiency have been observed to be the main limiting factor in biomass production and yield of various economic crops including winter wheat. Different cultivars which are results of breeding in various years have evolved to have different canopy structure. The canopy structure affects the canopy temperature, humidity and the spatial arrangement of leaves which directly affect radiation interception and eventually radiation use efficiency. The objective of this experiment was to study the effect of breeding in different eras from the 1960s on the canopy structure of winter wheat. Twenty seven cultivars were used for this experiment. Light interception and leaf area index were measured using Licor line sensor 1500 and Licor LAI 2200c respectively. The light extinction coefficient was thus calculated from these two values. Parameters such as fractional light interception (FLP), Leaf area index (LAI) and the light extinction coefficient (k) were collected in three layers within the canopy of each of the 27 cultivars of German winter wheat ranging from cultivars released in 1966 till 2013. It was found that total canopy K did not differ significantly for all cultivars ($p = 0.895$) while the canopy LAI variation was significant (0.045). In the first layer of the canopy (crown to the node of the flag leave) and in the third layer (middle to the ground surface), only the LAI for these layers were significant. But for the second layer, none of the parameters were significant. So we conclude that, breeding advancement has affected the leaf are index over this period rather than change the leaf angle to the vertical.

Key words: *winter wheat, radiation, breeding, leaf area index.*

EVALUATION OF G×E INTERACTION ON SALINITY TOLERANCE OF DIFFERENT WHEAT GENOTYPES

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Abstract

In order to evaluate the effects of the Genotype by Environment interaction (G×E) and to determine grain yield stability in winter bread wheat genotypes under salt stress conditions, 100 contrasting winter bread wheat genotypes (50 salt-sensitive and 50 salt-tolerant) were evaluated for salt tolerance in an experiment with alpha lattice design (10×10) with two replications in four environments in Yazd and Kerman provinces of Iran. Results of the combined analysis showed that the effect of genotype, environment and G×E were significant for plant height, number of grains per spike, and 1000 grain weight. However, the effect of genotype was not significant for grain yield. Based on mean grain yield over all environments, genotypes number 56 and 66 with 1.91 and 6.50 tons per hectare had the lowest and highest grain yield, respectively. Genotype number 53 under normal conditions and genotypes number 26, 69, and 57 under saline conditions in Kerman, had the highest and lowest grain yields, respectively. Based on regression analysis under normal and saline conditions, genotype number 95 had the general adaption ability and genotypes number 97 and 86 had specific adaptation ability under normal conditions. Results showed that genotypes number 50, 44, 95, 83, and 55 had better performance in comparison with salt-tolerant checks including Arg, Bam, and Kavir over all environments. Hence, these genotypes can be considered as salt-tolerant candidate genotypes to be used in wheat breeding programs or in Participatory Plant Breeding.

Key words: *Bread wheat, salt stress, grain yield, G×E effect, breeding, multi-location trials.*

IDENTIFICATION OF BREAD WHEAT GENOTYPES TOLERANT TO LATE GROWTH STAGE WATER DEFICIT STRESS USING STRESS TOLERANCE INDICES

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Abstract

Water deficit in the late growth stage is one of the limitation factor of wheat production in arid and semi-arid regions such as Iran and introduction of stress tolerant varieties is one the strategies that conquer to it. In this research, the reaction of 15 bread wheat genotypes to water deficit stress at the late growth stage were inspected using stress tolerance indices. Bread wheat genotypes were studied in both normal and stress states separately using RCBD design with three replications in farm condition. Analysis of variance revealed significant differences among studied genotypes based on tolerance indices. Mean comparison manifested that genotypes 3 and 8 could be considered as suitable genotypes for water deficit stress at the late growth stage. Classification of genotypes based on studied tolerance indices located them into three groups. Among studied indices, GMP, STI, YSI and SSI were identified as suitable indices in selection of drought tolerant genotypes at the late growth stage because they possessed significant relation with environmental yields. Results of triangle plots showed that genotypes 3 and 8 have the highest seed yield in both stress and non-stress conditions based on GMP, STI and SSI indices (Group A) and could effectively use in water stress state in the late growth stage.

Keywords: *Tolerance index, environmental yield, bread wheat.*

DROUGHT STRESS IN WHEAT (*TRITICUMA AESTIVUM* L.): AREVIEW OF EFFECTS OF DROUGHT STRESS AND TOLERANCE WITH EMPHASIS ON DROUGHT MANAGEMENT IN IRAN

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Abstract

Wheat is the dominant crop in semi-arid countries like Iran where it has being used for human food and livestock feed since several centuries ago. It is believed that different growth stages are intensively imposed by drought stress. Drought tolerance is an intricate trait that is governed by multiple genes, expression of each are influenced by various environmental factors, and can immediately affect morphological, physiological and anatomical attributes in wheat crop, thus leading to a severe reduction in overall production. The current study aimed to identify the most tolerant and susceptible attributes of wheat crops under different water stress regimes, and also to understand the most crucial plant growth phases in respect to yield-related traits. In order to induce drought tolerance capability in seedling of some wheat varieties, different physiological experiments should be undertaken. There are many agronomic approaches to address drought stress and its negative impacts on crop establishment, crop growth rate and biomass/seed yield. This review depictshow drought stress can trigger an extensive decline in morphological, physiological and anatomical traits in wheat crop. It also gives essential principles and a broad set of references beneficial for the management of drought tolerance under limited water conditions.

Keywords: *Drought stress, drought management, Iran.*

THE APPLICATIONS OF INDUSTRIAL ENGINEERING IN HORTICULTUREAND BREEDING

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Abstract

Horticulture development in many areas evolves through a number of stages regarding agrarianism or the so-called farming reform as the starting point, in which producers were granted land ownership so that they could do planting in their own farm. Industrial engineering has been applied in many industrial fields but this paper explores its applications in horticulture and plant breeding. Horticulture relates to man's livelihood but usually suffers as a weak sector in economics.Attentions to this filed is brought back through food safety and, therefore, this paper addresses an analogy between industrial engineering and horticulture production to demonstrate that industrial engineering can adapt to horticulture. In such system, low-input production, organic production and sustainable agriculture could be regarded in a new way. In particular, enterprise resource planning system can be implemented in farming, thus our short-term target is to transform traditional farms to modern ones to produce safe products. The enterprise resource planning system could be applied on plant breeding process to breed new genetically improved veracities effectively. The finaltargets are to provide safe products and to increase farmers' income as well as preparing new job opportunities which are expected to be created in modern farms.

Keywords: *Enterprise resource planning system, horticulture production, modern farms.*

FIELD PERFORMANCE EVALUATION OF VARIOUS RICE HARVESTING METHODS: A CASE STUDY IN GUILAN, IRAN

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Abstract

In mechanized harvesting, it is very important to develop an appropriate rice reaper for decreasing cost and crop losses. In this study, the field performance of two rice reapers (self-propelled and knapsack power reapers) was compared with manual harvesting. The experiment was conducted in split-plot design with the variety as the main factor in two levels (*Hashemi* and *Khazar*) and the harvesting method as sub-factor in three levels (three harvesting methods) based on randomized complete block design in three replications. The results revealed that the effective field capacity of a self-propelled reaper (0.237 $ha.h^{-1}$) and knapsack power reaper (0.048 $ha.h^{-1}$) was significantly higher than that of the manual harvesting (0.0083 $ha.h^{-1}$). The time required for harvesting of one hectare using the self-propelled and knapsack power reapers was decreased 96.5 and 82.6, respectively as compared with manual harvesting. The labor requirements in harvesting in manual method were 159.7 $man\text{-}h.ha^{-1}$ and those of the self-propelled and knapsack power reapers were determined 52.22 and 68.74 $man\text{-}h.ha^{-1}$, respectively. The harvesting loses of self-propelled reaper, knapsack power reaper and manual methods were registered 2.42, 2.58 and 2.18 %, respectively. The net saving cost using self-propelled and knapsack power reapers were obtained 7940728 and 4444297 $Rial.ha^{-1}$ as compared to manual harvesting. The break-even point for knapsack power and self-propelled reapers was determined 2.00 and 11.42 $ha.year^{-1}$, respectively.

Keywords: *Rice reaper, manual harvesting, rice losses, harvesting cost.*

EFFECT OF CERTAIN ELEMENTS ON QUANTITATIVE PROPERTIES DEPENDING ON THE GENOTYPE IN OILSEED RAPE - BRASSICA NAPUS L.

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Abstract

As a result of the use of the following elements - nitrogen (N), sulphur (S) and boron (B) - quantitative properties of two genotypes of oilseed rape - Brassica napus L., Zorica (variety) and Rohan (hybrid) were determined. The main purpose of the study was determination of the production mode, set in both genotypes of oilseed rape versus managing various nutrients. Experiment was set in the Skopje region, on total experimental area of 650m^2. For this purpose, the following combinations of fertilizers were used: N_1 with 110 kg/ha nitrogen, N_2 with 150 kg/ha nitrogen, S_1 with 30 kg/ha sulphur, S_2 with 70 kg/ha sulphur, B_1 with 1.0 kg/ha boron, and B_2 with 2.0 kg/ha boron (at spring time, foliar application) versus standard variant: N:P:K in the ratio 10:20:30 (N 50kg/ha, 90 kg/ha P_2O_5 and 180 kg/ha K_2O) used in autumn. During the experiment the following parameters were monitored: height of plants (cm), number of branches per plant, number of pods per plant, length of pod (cm), number of seeds in the pod, and seed yield (kg/ha). From the combinations of nutrients and variations that have been set in terms of genotypes, Zorica variety showed statistical significance at level of 0.05 including variants 3, 4, 5, 11, 13 and 15, while the hybrid Rohan showed statistical significance at level of 0.05 at variants 8 and 11, and statistical significance at level of 0.01 at variant 13.

Keywords: *Yield, nitrogen, sulphur, boron, foliar application.*

PHYSICAL AND CHEMICAL CHARACTERISTICS OF POMEGRANATE FRUIT (*PUNICA GRANATUM* L.), OF CV. KARAMUSTAFA

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Abstract

Pomegranate is well-adapted fruit species to arid and semi-arid conditions. As a highly valued crop, it is widely cultivated in Mediterranean and Near Asia countries. During the Ottoman occupation in Balkans, it was brought as wood material to R. Macedonia and currently important pomegranate cultivars in Macedonia has Ottoman names such as Bejnarija, Lifanka, Karamustafa, etc. Its fruit has been using as fresh and also processed into juice, wine, candy, etc. The objective of this study was to analyze the physical parameters of the pomegranate fruit and chemical properties of juice from pomegranate fruit of Karamustafa cultivar, grown in two different locations of Republic of Macedonia. The physical parameters including fruit fresh weight, percentage of grain (%), weight of 100 berries (g), percentage of juice (%) and morphological characteristics (equatorial diameter, calyx diameter, fruit height without calyx, total fruit height, calyx height). Based on the results we found significant differences in the weight of the fruit, the content of total acids and the content of total phenols in the juice.

Key words: *Punica granatum, fruits, physical and morphological parameters, chemical properties of juice.*

EFFECT OF FRUIT RIPENING ON MORPHOLOGICAL AND CHEMICAL CHARACTERISTICS OF OPUNTIA FICUS INDICA FROM MOROCCO

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Abstract

Cacti are flowering plants; their flowers produce seed-bearing fruit. In Morocco, as in other North African countries, the most widespread species of cacti are *Opuntia dillenii, Opuntia vulgaris, Opuntia compressa* and *Opuntia ficus indica*. The latter is the main species that produces edible fruits (prickly pears). Few scientific publications have focused on the physical and chemical characteristics of the cactus fruit being limited to the fruit at the stage of full maturity. The objective of the present study was to examine the morphological and physiochemical characteristics of some of the most abundant *Opuntia ficus indica* cultivars in Morocco: *Aissa, Moussa, Shoul* and *Dellahia*, at different stages of maturity, as related to the apparent peel color variations.. All the analyses were performed according to international standards. Morphological characteristics focused on several parameters, such as weight (g), length (cm), width (cm), shape and size of the fruit, etc. The physiochemical characteristics, determined at different stages of maturity, were PH, acidity, moisture, ash, Brix, content of sugars, vitamin C, and oil content. For the morphological study, the results showed that some parameters such as length, width and weight of fruits and skin varied from one variety to another but did not change depending on maturity stage. For the physiochemical study, the results showed that the acidity and moisture decreased with the stage of maturity; however, the pH, Brix, total sugars, vitamin C and oil content varied from one variety to another and increased with the stage of maturity. This research showed the potential value of cactus-pear fruits as a good source of natural energy and antioxidants such as vitamin C. Based on its low acidity and high sweetness, cactus-pear pulp could be very suitable as a natural additive or substituted material in the production of many foodstuffs.

Key words: *Opuntia ficus indica, morphological study, physiochemical study, maturity stage.*

BORON INFLUENCE THE BIO-SYNTHESIS OF METABOLITES IN CANOLA SEED

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Abstract

A 2-year field experiment was conducted to determine the effect of boron (B) levels on oil content and quality parameters of canola cultivars at Koont research farm of PMAS-Arid Agriculture University Rawalpindi (Pakistan) under rainfed conditions. Experiment was comprised of four canola cultivars *viz.*, Faisal Canola, Pakola, PARC Canola hybrid and Rainbow and three levels of boron (0, 1, 2 kg ha^{-1}). The interactive effect of canola cultivars and B levels showed significant effect on oil content, protein content, linolenic acid content and erucic acid content while non-significant difference were found in oleic acid content. The B application showed significant differences for oil and linolenic acid content. Oil content indicates the direct relation with B application, maximum oil content was recorded when B was applied 2 kg ha^{-1},while linolenic acid content showed the inverse relationship with B application. However, protein content, oleic acid content and erucic acid content showed non-significant differences for varying B levels. Amongst cultivars Pakola produced the maximum oil content, while higher protein and linolenic content were found in Faisal Canola. It is concluded that Pakola has higher concentration of oil contents at 2 kg B ha^{-1}application but less concentration of other metabolites under rainfed conditions.

Keywords: *Boron, bio-synthesis, metabolites, canola cultivars, rainfed regions.*

IMPROVING THE PRODUCTIVITY OF SUGAR BEET (*BETA VULGARIS* L) GENOTYPES UNDER VARIOUS SOWING METHODS IN ARID REGIONS

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Abstract

In view of the severe scarcity of irrigation water for sugarcane and ever mounting population pressure, there is a dire need for exploiting the potential of sugar beet crops grown in dry land conditions. The experiment was carried out during the winter season 2015-16 in the arid subtropical dry land conditions of Layyah, Pakistan, to evaluate different sugar beet (*Beta vulgaris*) genotypes for yield and quality under flat, ridge and bed cultivation methods. The experiments were laid out in a factorial design, in which five exotic sugar beet genotypes namely California, Arinka, Sandrina, Estiban and Ernistina were grown in sub-plots, while the flat, ridge and bed cultivation methods were used in the main plots. The results revealed that the yield and quality parameters were significantly different (<0.05) for the genotype as well as for the sowing methods. Among the genotypes, California showed the highest significant values for the biological and root yield. The ridge sowing method had significantly higher values for the yield and quality parameters than the flat cultivation method. Similarly, the bed sowing method had also the average values for the yield and quality parameters, as compared with the flat cultivation method. It is concluded that the genotype California grown on the ridge has potential to be adopted under Thal region of Layyah.

Key words: *Sugar, sowing method, arid, yield*.

FOLIAR APPLICATION OF THIOUREA IMPROVES THE SAFFLOWER YIELD AND QUALITY

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Abstract

Safflower (*Carthamus tinctorius* L.) is an important medicinal oilseed crop. Thiourea is a sulphur-containing compound that positively influences the performance of oilseed crops. This study was conducted to evaluate the impact of foliarly applied thiourea on the performance of four safflower genotypes viz. 16427, 16493, 26733 and 26748. Thiourea was foliarly applied to all the genotypes at 250, 500, 750, and 1,000 ppm; a treatment with no thiourea application was taken as control. The results indicated that the foliar application of thiourea significantly improved the growth rate of crops, stay-green, plant height, number of branches, pods per plant, number of seed per pod, 1,000-seed weight, biological and seed yield and oil quality of all safflower genotypes. Of all applied concentrations of thiourea, foliar application at 1,000 mg L^{-1} was most effective in improving crop growth rate, morphological and yield-related parameters and oil quality. When observed by genotype, the highest seed yield was recorded in genotype 16493. Accordingly, people might opt for the foliar application of thiourea at 1,000 mg L^{-1} to improve the performance (yield and quality) of safflower.

Key words*:* *Safflower, Thiourea, seed yield, oil content.*

GERMINATION AND GROWTH BEHAVIOR OF CAULIFLOWER (*BRASSICA OLERACEAE* L) CULTIVARS TOWARDS SALINITY

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Abstract

The cauliflower (*Brassica oleraceae* L.) is a cool season crop grown for its tender, white head or curd. It is rich in minerals, carbohydrates and vitamins A and C. Salinity is a major abiotic stress factor that affects almost every aspect of physiology and biochemistry of plants and significantly limits the production of the cauliflower. The present study was conducted to screen out the salt tolerant cultivars of the cauliflower that can withstand higher concentration of salts in the root zone. Ten cauliflower cultivars i.e. First early, Second early, Mid variety, Late variety, First Early Asowjah, K-2, Katki, YS-78, Dervesh-31 and Dervesh-41 were sown and exposed tofour levels of salinity (0, 30, 60 and 90 mM). There was a marked decrease in seedling fresh weight, seedling dry weight, shoot length, root length, root shoot ratio, emergence percentage, mortality percentage and chlorophyll contents in all the cultivars with increasing salinity levels,whereas sodium and chloride ion concentrations were increased with the increase in salinity. It was concluded that the salinity had affected almost all the cauliflower cultivars.However, First Early Asowjah was the cultivar that performed best under high salt stress while Dervish-41cultivars were seriously affected under saline conditions and the remaining cultivars exhibited the moderate attitude.

Key words: *First Early Asowjah, Dervish-41, abiotic stress, salt tolerant, production.*

EFFECT OF DIFFERENT POST-HARVEST TREATMENTS TO IMPROVE THE PHYSICO-CHEMICAL CHARACTERISTICS OF GUAVA (*PSIDIUM GUAJAVA*) FRUIT CV. SURAHI

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Abstract

The guava is frequently advertised as "super-fruit", rich in dietary fiber, vitamins A, C and riboflavin. Guava fruit is perishable in nature and has a shortened life span. After harvesting, it's ripening starts due to its climacteric nature. Large quantities of this fruit spoil from harvesting to marketing and from the market to consumers because of its short life span i.e. 2 to 4 days at room temperature. The present study was conducted to improve the biochemical characteristics and shelf life of guava cv. Surahi fruits grown in Pakistan. There were a total of 6 treatments, i.e. T_1 = 200 ppm chlorine, T_2 = 2% H_2O_2, T_3 = 2% $CaCl_2$, T_4 = 5% aloe vera gel, T_5 = 5% gum Arabic, T_6 = 5% aloe vera gel + 5% gum Arabic and one control (T_0). The fruits were kept at 15-17 ^oC and were carefully examined with reference to different quality parameters, like weight loss percentage, titratable acidity, pH, total soluble solids, firmness, ascorbic acid contents and color. The recorded data were statically analyzed using LSD at5% level of significance. T_6 (5% aloe vera gel + 5% gum Arabic) proved to be the best treatment to improve the biochemical characteristics and to increase the shelf life of guavas up totwo weeks, keeping the fruits at ambient temperature.

Key words: *Guava, Surahi, aloevera gel, gum Arabic, Pakistan.*

EFFECT OF OSMOTICUMAND SILICA-GEL DESICCATION ON SOMATIC EMBRYOGENESIS FROM CALLUS CULTURES OF BIGNONIAADENOPHYLLA DC

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Abstract

*Bignonia adenophylla*is cultivated in parks and gardens as an ornamental plant known for the beauty of leaves and mystic shape of its pods. It has medicinal properties against myeloblastosis virus and Rauscher murine leukaemia virus, and root extract for the treatment of snake bite. In the present study, we presented an efficient method for in vitro propagation through somatic embryogenesis (SE). SE is an important aspect for in vitro propagation of woody plants. For this purpose, cotyledons were excised from *in vitro* seedlings and cultured on MS medium + thidiazuron (TDZ) or N^6-benzyladenine (BA) in combination either with indol-3-acetic acid (IAA), α-naphthaleneacetic acid (NAA) or 2, 4-Dichlorophenoxyacetic acid (2, 4-D) for callus induction. Initially, nodular and green calluses were cultured on different levels (0, 25, 50, 75 or 100%) of MS medium + 0, 1.5, 3 or 6% sucrose for 4 days. In another experiment, silica gel powder at 0, 5, 10, 15 g/L in plain agar medium was used for production of desiccation environment. Highest (75%) callus induction with 0.139g dry weight was obtained at 2 µM BA in combination with 4 µM 2, 4-D after 26 days. The rate of SEwas highest (80%) with 68.24 mean number of SE was obtained at 15 g/L silica gel after 15 days. SE only observed from those callusesthat previously were grown on TDZ + 2, 4-D. Germination of somatic embryos was 11% and developed to cotyledonary stage after 36 days. We demonstrated an efficient method of SE for mass scale in vitro propagation for the first time in this tree species.

Keywords: *Bignonia adenophylla, silica-gel desiccation, somatic embryogenesis, osmoticum, thidiazuron.*

EVALUATION OF PRODUCTION IN SEGREGATING GENERATIONS DERIVED FROM INTERSPECIFIC CROSSES (H.*ANNUUS*) AND (H. *ARGOPHYLLUS)*

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Abstract

Limited water availability suggests that in future water insufficiency will be norm which leads to the major losses in yield and yield components. Management under these conditions as compared to unlimited water availability may result in reducing yield losses. Study was started to improve crop production by introgression of drought tolerant traits from wild sunflower to cultivated type of sunflower.Resultantly material of filial generations F1, F2, and F4 is analyzed on the basis of some phenotypic and physiological indicators. When compared to parents UCA-16 and Argo-5-IV these segregating populations have mean value in F1 and when compared by leaf parameters like leaf rolling, hairiness, leaf colour and waxes produced by cuticular layers, they behaved differently. Inselected material of successive generations on cell membrane injury, achene yield and single head type will be further grown by keeping ultimate objective of drought tolerant inbred line.

Key words: *Introgression, production, leaf color, tolerant inbred line, leaf rolling.*

IN VITRO OVULE CULTURE OF *CITRUS* GENOTYPES FOR EVALUATING EMBRYOGENIC CALLUS INDUCTION POTENTIAL

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Abstract

Callus cultures of citrus have been exploited usefully in various ways like introgression of genes, genetic and epigenetic assessments, understanding transcriptional profiling, investigation of molecular mechanism of apomictic embryogenesis and several others. *Citrus* genotypes were manipulated *in vitro* for improvement. Ovules as explants from indigenous *Citrus* germplasm were cultured *in vitro* to determine their response towards embryogenic callus induction. The protocols were standardized for callus induction using salts and vitamins of MT with two combinations of growth regulators i.e. [2,4-D (100 μgL^{-1}) + BAP (100 μgL^{-1})] and [Malt Extract (0.5 gL^{-1}) + Kinetin (5 mgL^{-1})] called EBA and DOG respectively. The differential response, of the two media and genotypes under study were compared for *in vitro* callus induction. The induced calli were subsequently allowed to grow with frequent subcultures to evaluate the differences in regeneration potential. Responsiveness of ovules in medium EBA was significantly more than in DOG. The percentage of callus induction was found significantly higher (49%) in 'Valencia orange' when cultured in medium EBA while minimum (20%) was observed in 'Citrumelo-1452'. Color, morphology, quantity and growth habit of calli from each genotype was recorded at different levels. In general, more number of days to callus initiation and regeneration were observed in DOG than in EBA. Maximum days to callus initiation (67) were taken by 'Citrumelo-1452' while the minimum (41 and 39) were observed in 'Lemon' and 'Valencia orange' respectively. Likewise, more days to regeneration were taken in medium DOG as compared to EBA. 'Citrumelo-1452' took maximum number of days (84) to regeneration against the minimum (53) observed in 'Valencia orange'.

Keywords: *Citrus, in vitro, callus induction, ovule culture, regeneration.*

THE CORRELATION BETWEEN THE NUMBER OF KNIVES ON THE IMPELLER, IMPELLER SPEED AND SHIFTING GRAPPLE SPEED

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Abstract

The paper presents the studies performed on a grapple with vertical impeller, taking into account its working parameters, starting from its construction, the operating parameters and the indicated quality of the work. The construction field can have two, four, six, eight or ten impellers that receive the rotation movement from the last shaft of the power outlet at independent speed. The variation in the number of knives on the rotor leads to a decrease in the thickness of the splinter, together with the increase in the degree of soil breaking. The same can be done by keeping a small number of knives on the rotor, but by increasing the speed of the rotor by actions of the speed of the tractor, in turn requires its correlation with the number of knives on the rotor and the speed of the impeller to obtain superior qualitative indices of the work. Operating parameters are represented by the number of knives on the impeller, the impeller speed and the displacement speed of an aggregate. The qualitative indices of the work refer to working depth, degree of soil degradation, coverage of vegetal remains, degree of weed destruction and level of soil. By actions on the number of knives, the speed of rotation and the speed of movement of an aggregate, we aim at obtaining qualitative indices of higher labour, increasing the working capacity and productivity of the aggregate, while reducing fuel consumption.

Keywords*:* *Rotor, knives, rotation, power, tractor.*

EFFECT OF SAPROPELS ON YIELD OF GRAIN CROPS AND ACIDITY OF THE LEACHED CHERNOZEM

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Abstract

In this paper we showed effect and an after-effect of sapropels, limes, mineral fertilizers on productivity of grain crops and acidity of the leached chernozem. Growth of productivity of grain crops at introduction of sapropel in first experiment has made up to 20%. In the second experiment annual use of mineral fertilizers productivity of spring wheat increased by 14,7%, single introduction of sapropel promoted increase of productivity for 5,8-7,7%. Sharing of a chemical ameliorant, sapropel and nitrogen-phosphorus fertilizer led to growth of productivity by 16,7-22,4%.

Key words: *Yield, sapropels, chernozem.*

EXPERIMENTAL DEVELOPING AND SYNTHESING OF NEW TYPES AND HYBRID FORMS OF THE GENUS LAVANDULA

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Abstract

This research studied cytogenetic aspects of sterility in allogaploid hybrids of lavender in the crossbreeding of *Lavandula angustifolia* Mill. and *L. latifolia* Medic. The specific getting ways of fertile distant lavender hybrids has been shown. The researchers developed different ways of getting hybrids with minimum quantity of the *L. latifolia* genetic material with the allopolyploid forms as the intermediary ones. As the result of this research, some developed morphological and biological, anatomic and cytogenetic characteristics of the initial and synthesized forms were given. The typical diagnostic signs for an accelerated indication of forms were found.. The tetraploid level of two types of lavender was transformed, which have a high interest for the selection. For the first time 15 auto- and allopolyploid forms of lavender with different numbers of genomes of *L. angustifolia* and *L. latifolia* were synthesized in different combinations. Good breeding with allo- and autopolyploid forms can result in hybrid forms of lavender with different ratios of genomes, which gives breeders the opportunity to weaken or strengthen the complex of features of one or another component with crossbreeding. The example of the crossbreeding of *L angustifolia* x *L. latifolia* (AL, 2n=48), (AALL, 2n=96), (AAL, 2n=72), (AAAL, 2n=96) with the following ratios of genomes 1:1, 1:2, 1:3, 2:2 shows direct dependence between the increasing number of genomes of *L. angustifolia* and its features, both quantitative and qualitative. This study was funded by research grant N 14-50-00079 of the Russian Science Foundation.

Key words: *Lavandula sp, hybrid, genome, allopolyploid forms, selection.*

EVALUATION OF POTATO PRODUCTION UNDER MINERAL AND ORGANIC FERTILIZATION

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Abstract

The potatoes are considered as vegetable rich in nutritional values and favorable for the Arabic consumers. Because of the damage for potatoes resulting from the excessive use of chemical fertilizers in the production of potatoes, the question about the possibility of sufficiency use organic just to get the output of an economic crop of potatoes catalog, as this fertilizer is safe and has no risk as chemical fertilizers. Therefore, the variety "Atlas" and "Spunta" locally produced potatoes were grown in lines under the field condition. All varieties were treated with the following fertilizer doses: without nitrogen fertilization (control), 100% organic fertilizer (poultry), 75% organic fertilizer (poultry) + 25% mineral fertilizer (urea), 50% organic fertilizer (poultry) + 50% mineral fertilizer (urea), 25% organic fertilizer (poultry) + 75% mineral fertilizer (urea), 100% mineral fertilizer (urea), 150% mineral fertilizer (urea), 200% mineral fertilizer (urea). The results have showed that the variety Atlas exhibited the highest values in the chlorophyll in the two seasons, and also for the number of the tubers for marketing. The treatment of 25% organic ferlilizer (poultry) + 75% mineral fertilizer (urea) the showed the lowest values for the chlorophyll content. The results showed that the lowest production notable for marketing was found with the treatment of 50% organic fertilizer (poultry) + 50% mineral fertilizer (urea) during both years. The lowest number of tubers not fitting for marketing was found at the treatment of 50% organic fertilizer (poultry) + 50% mineral fertilizer (urea) with Spunta. Results showed that the best production for potatoes was at 50% organic fertilizer (poultry) + 50% mineral fertilizer (urea). It is clear that organic fertilizer is not sufficient for potato yield to produce a high quality and quantity yield.

Key words: *Organic potatoes, chemical fertilizers, farm yard manure, mineral fertilizers, chicken manure.*

PHENOTYPIC AND BIOCHEMICAL PROFILE CHANGES IN CALENDULA PLANTS TREATED WITH TWO CHEMICAL MUTAGENESISES

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Abstract

Chemical mutagenesis is an efficient tool used in mutation-breeding programs to improve the vital characters of the floricultural crops. This study aimed to estimate the effects of different concentrations of two chemical mutagens; sodium azide (SA) and diethyl sulfate (DES). The vegetative growth and flowering characteristics in two generations (M1 and M2) of *Calendula officinalis* plants were investigated. Seeds were treated with five different concentrations of SA and DES of 1000, 2000, 3000, 4000, and 5000 ppm, in addition to a control treatment of 0 ppm. Results showed that lower concentrations of SA mutagen had significant effects on seed germination percentage, plant height, leaf area, plant fresh weight, flowering date, inflorescence diameter, and gas-exchange measurements in plants of both generations. Calendula plants tended to flower earlier under low mutagen concentrations (1000 ppm), whereas higher concentrations delayed flowering significantly. Positive results on seed germination, plant height, number of branches, plant fresh weight, and leaf area were observed in M2-generation at lower concentrations of SA (1000 ppm), as well as at 4000 ppm DES on number of leaves and inflorescences. The highest total soluble protein was detected at concentrations of 1000 ppm SA and 2000 ppm DES. DES showed higher average of acid phosphatase enzyme activity than SA. Results showed that lower concentrations of SA and DES mutagens had positively affected the seed germination percentage, plant height, leaf area, plant fresh weight, flowering date, inflorescence diameter, and gas-exchange measurements. Thus, lower mutagen concentrations could be recommended for better floral and physio-chemical performance.

Keywords: *Diethyl sulfate, enzyme activity, gas-exchange, mutation, sodium azide.*

PRODUCTIVE CHARACTERISTICS OF THE SOYBEAN [*GLYCINE MAX* (L.) MERR.] AS FORAGE IN THE SECOND CROP

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Abstract

In 2014, the soybean was sown on 117,549,053 hectares, and the world yield was 2,608 kg ha^{-1}. In Serbia, soybeans are mainly produced for grains, and the grain yields of 3.539 kg ha^{-1} were achieved. In addition to the production of grain, soybeans can be grown as a second crop in intercropping with maize or sorghum and as a single crop intended for the production of forage that can be preserved with ensiling. As for double cropping production of soybeans for grain, varieties of shorter vegetation end the vegetation earlier, which makes them more suitable for grain production in double cropping. However, the issues in the production of forage in second crop and preservation by ensiling is which varieties are more productive and better adapted to such a production model. The objective of the study was to determine the productivity of two soybean varieties of different vegetation, used as the second crop. Based on the results, it is apparent that the variety had a statistically significant effect on the yield of raw biomass, number of pods, dry weight and percentage of dry pods. The obtained differences were significant, and indicated the potential for higher yields forage when varieties of longer vegetation period are sown. A significantly higher yield of raw biomass (24,400 kg ha^{-1}) was recorded for the varieties of longer vegetation period, compared to the varieties of shorter vegetation, while more grains per pod and percentage of pods in the total weight of the plant was recorded for the varieties of shorter vegetation (68.81%).

Key words: *Soybean, second crop, yield of biomass.*

THE EFFECT OF THE APPLICATION OF GROWTH REGULATORS ON ALFALFA SEED YIELDS

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Abstract

In Serbia, alfalfa is one of the most important forage crops. Domestic varieties are well adapted to local conditions and most of the seed for domestic purposes is produced in Serbia. In order to realize high yields of alfalfa seeds it is necessary to achieve the optimal balance between vegetative and generative stages of development. One of the factors that have an adverse effect on the production of alfalfa seeds is flattening. To ensure successful seed production it is often necessary to implement agro-technical measures to prevent growth of alfalfa in the seed harvest. It is possible to influence the growth of plants by using growth regulators. The aim of this research was to investigate the influence of the application of growth regulators (*daminozide*) on alfalfa seed yields. The growth regulator made an impact on the height of the plants. In all the years, the lower height was recorded in the variant treated with growth regulators. The greatest impact of the growth regulator on the plant height was recorded in the year with higher amounts of precipitation. In years with less rainfall, the impact of the application of the growth regulator on the plant height was lower. With the application of the growth regulator, on average, more stems per plant were formed as well as more branches, and the number of pods increased, but these differences were not statistically significant in all years. In the year with higher amounts of precipitation, the growth regulator has contributed to an increase in the yield of the seed. In other years, the values were very close to the control and were not statistically significant.

Key words: *Alfalfa, seed, growth regulator, yield.*

VARIABILITY EARLINESS OF AUTOCHTHONOUS POPULATIONS PHLEUM PRATENSE L.

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Abstract

Phleum pratense (L.) is a perennial grass. Grasses are represented in almost every ecosystem and are an important part of the natural food chain. The aim of this study was to determine the variability of the population germplasm *Phleum pratense* L. In this paper, a collection of 20 indigenous populations of timothy *Phleum pratense* L. originating in western Serbia was studied in heading time. A two-year studies were carried out in Valjevo. Analyzes of variance showed significant differences between the studied populations. Started in time of heading for all population amounted to an average of 59.40 days. The highest stability of tested parameter by years had the population originating from locality Pričević (CV = 1.63%). Variability of tested parameters for all studied populations, within a year was low and ranged between 10.94% < CV < 12.45, which indicates that the data were homogeneous. Variability between years was very small and ranged between 1.63% < Cv < 5.21, the exception the population originating from the locality Carina where the Cv amounted to 46.37%. Evidently, that the year had a statistically significant effect on tested parameter in the population originating from the locality of Carina. Based on the research, it is evident that the population of *Phleum pratense* (L.) has later earliness. The earliness is the most commonly used criterion in breeding perennial grasses.

Keywords: *Autochthon populations, Phleum pratense L., variability, earliness.*

BIOMASS PRODUCTION OF GRAIN AMARANTH (*AMARANTHUS CRUENTUS* L.), VARIETY PRIBINA

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Abstract

The aim of the project was the comparison of the biomass production ability of two grain cultivars of purple amaranth as a by-product produced with seed production and the verification of the amount of remaining plant residuals in the soil after harvest. We have used a new Slovak variety of the purple amaranth (*Amaranthus cruentus* L.) registered as 'Pribina' variety and 'Aztec' as control variety. 'Pribina' was bred by the Institute of Plant Genetics and Biotechnology, Plant Science and Biodiversity Center, SAS in Nitra in cooperation with Department of Ecology, Faculty of Humanities and Natural Sciences, University of Prešov in Prešov. The weight of above-ground fresh biomass (stems, leaves and inflorescences with seeds) observed to be 9379.9 $g.m^{-2}$ for 'Pribina' variety and 10450.0 $g.m^{-2}$ for 'Aztec' variety. The seed weight was 569.2 $g.m^{-2}$ and 744.2 $g.m^{-2}$ for 'Pribina' and 'Aztec' varieties, respectively. The integral part of this experiment was the evaluation of biomass weight of stubble and roots as a source of organic matter in the soil. The fresh weight of stubble residuals after harvest was 540.2 $g.m^{-2}$ for 'Pribina' variety and 707.4 $g.m^{-2}$ for 'Aztec' variety. The fresh weight of plant roots was 609.3 $g.m^{-2}$ for 'Pribina' variety and 757.6 $g.m^{-2}$ for 'Aztec' variety. Above-mentioned results shows that 'Aztec' variety has higher weight of above-ground fresh biomass (without seeds) (9705.8 $g.m^{-2}$) in compare to 'Pribina' variety (8810.7 $g.m^{-2}$). As result of the project, we observed that by-product of grain amaranth growing can be used as prospective source of raw material for biogas production.

Keywords: *Fresh biomass, purple amaranth, seeds, varieties Pribina and Aztec.*

THERMAL INACTIVATION KINETICS OF PEROXIDASE IN GALEGA KALE (*BRASSICA OLERACEA*L.VAR. *ACEPHALA* CV. GALEGA)

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Abstract

The consumption of *Brassica* spp. is quite high and it represents an important part of a well-balanced diet in the northwest of Spain. *Seasonality* and perishability cause that some of these vegetables are in the necessity of applying preservation technologies. Some of these technologies are frequently preceded by blanching. In general, the blanching limits the losses of nutritive and organoleptic qualities during processing. Peroxidase is one of the most heat-resistant of vegetable enzymes, which has led to it being used as an indicator of the adequateness of the blanching process. This enzyme has also been associated with losses in the colour, flavour and nutritional values of raw and processed foods. The inactivation of peroxidase depends on the temperature of the blanching water and the type and size of the vegetable. Galega kales (*Brassica oleracea* var. *acephala*) area popular vegetable among people from Northwest Spain, which is easy to find among local markets. Blanching was applied in this study in order to examine the inactivation of peroxidase in Galega kales. The objective was to obtain kinetic parameters of peroxidase inactivation that can be used in further analyses. Inactivation experiments were carried out at five different temperatures ranging75–95ºC. The peroxidase activity was followed spectrophotometrically at 470 nm. Kinetic parameters, D and *z* values, were also determined. Fresh Galega kale had high initial peroxidase activity in this study. The enzyme inactivation was dependent on temperature and heating time. Peroxidase activity showed first-order kinetics with z values of 15.51ºC.

Keywords*: Peroxidase, Galega kales, blanching, inactivation, kinetic parameters.*

STUDY OF ALLELOPATHIC EFFECTS OF CUPRESSUSARIZONICA AND LENTISCUSPISTACIA ESSENTIAL OILS AGAINST GERMINATION OF WEEDS UNDER NATURAL CONDITIONS

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Abstract

There is a great incentive to discover effective and economically feasible herbicides that are toxicologically and environmentally benign, to replace pesticides that have been withdrawn for regulatory reasons or are ineffective, due to the increasing difficult of managing pest resistance. Allelopathy in natural and agricultural ecosystems is receivingincreasing attention because allelochemicals significantly reduce the plant growth and the yields of crop plants . Therefore, using of alternative means, such as products-based essential oils to control herbaceous layer, is needed because of their high potential as natural herbicides that are friendlier to the ecosystems.This work focused on studying the inhibitory effect of two formulated essential oils; one based on Cupressusarizonica collected from the region of Saida and the other one based on Lentiscuspistacia of the region of Tipaza. The treatments were carried out in the field, dilutions prepared from a 10% concentrated stock solution to obtain respective doses: D1 = 0.1 g / l; D2 = 0.2 g / l and D3 = 0.3 g / l. The results showed that the bioproducts based on essential oil of the two plants had different actions on the germination of the herbaceous stratum according to the dose and the time. The results showed that the essential oil-based bioproducts of the two plants had different actions on the herbaceous layer germination according to dose and time. The lowest germination rate was observed in the Saida cypress bioproduct not exceeding 2%. Indeed, the strongest inhibition was obtained with the lowest dose (D1) for both products with respective rates of 98.39% for Cupressusarizonica and 93.55% for the product based on Lentiscuspistacia.

Keywords: *Allelopathy, Cupressusarizonica, essential oils, herbaceous layer, inhibition, Lentiscuspistacia.*

EFFECT OF TEMPERATURE AND WATER APPLICATIONS ON COMMON VETCHGERMINATION AND SEEDLING PROPERTIES

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Abstract

Annual legumes, most of them well adopt to cool season, have advantages under the area with prevailing continental and the Mediterranean climatic conditions. Temperature has crucial role to determine sowing time especially late autumn and early spring sowing, and soil moisture regimes have the most important role for emergence and seedling survival of all plant species. In this study, germination and seedling properties of common vetch were examined under manipulated temperature and water regimes ingrowth chamber. The experiment was carried out to determine temperature (3, 6, 9 ^{0}C) and water (I wet-days/week, II wet-days/week, III wet-days/week, IV wet-days/week) regimes on germination and seedling properties of common vetch. The experiment was arranged in completely randomized experiment design with five replications. Each replication consisted of 25 seeds placed in a petri dish, with daily observing recorded during 30 days. During the experiment, plant and root height, dry matter, pH and electrical conductivity properties were examined. As the temperature increasing germination and seedling properties of common vetch affected positively compared to the lower temperatures.The germination and seedling properties of common vetch were also affected by the water regimes. Temperature and water regime interactions were significant for the most of investigated parameters. These results showed that both temperature and water regimes and their interactions influenced germination and seedling properties of common vetch. The warmer and wet conditions were more favourable than cool and dry conditions to achieve good stand for common vetch.

Keywords: *Temperature, water regimes, germination, seedling.*

EFFECTS OF N AND P FERTILIZATION ON TRITICALE AND COMMON VETCH PLANTS IN PLANT HEIGHT WITH PLANTS DRY-FORAGE YIELD

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Abstract

This study was conducted to determine the effects of nitrogen and phosphorus fertilizers on plant height and plants were Dry-forage yield ranged of intercropped common vetch and triticale in Şanlıurfa province (Turkey) in 2010 and 2012. The study was designed as split-plots where main plots were treated with different levels of phosphorous while split-plots (sub-plots) were treated with different levels of Nitrogen with three replications. 40% and 60% seed ratio for triticale and common vetch respectively was determined based on the available literature. Seed amount in the mixture of individual plants were determined as considering their sole crop seed amount which as 20 and 10 kg/da for triticale and common vetch respectively. Pure Nitrogen and Phosphorous were applied at rate of 0, 3, 6, 9 and 12 kg/da by using fertilizers in the forms of ammonium sulphate and triple super phosphate fertilizers. In the study, 5 different characteristics were investigated. Application of nitrogen and phosphorous fertilizers caused a significant increase in dry forage yields. In the highest Tritacale 136.40 cm, 6 kg/da nitrogen and 6 kg/da phosphorous were applied. In the highest common vetch 99.45 cm,3 kg/da nitrogen and 3 kg/da phosphorous were applied. Dry-forage yield ranged from 762.81 to 1478.8 kg/da. The highest dry yields were 1545.3 kg/da when 9 kg/da nitrogen and 6 kg/da phosphorous were applied.

Keywords: *Common vetch, Triticale, Nitrogen, Phosphor, fertilizing, yield component.*

PLANT NUTRIENT STATUS OF SOUR CHERRY (*PRUNUS CERASUS* L.) CULTIVARS GROWN IN AEGEAN REGION OF TURKEY

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Abstract

The study was conducted on 29 sour cherry (Prunus cerasus L.) cultivars collected from Aegean Region of Turkey for assessing the plant nutrient contents and their relations with soil characteristics. Total quantities of N, P, K, Ca, Mg, Fe, Zn, Mn and Cu accumulated within the leaf and fruits were used to make provisional estimates of the uptake of plant mineral essential nutrients by the cherry cultivars used in this study. All investigated nutrients were recorded significantly different within the cultivars. The concentrations of all elements except Zn in sour cherry leaves were ranged in referenced limits. Fruit mineral contents of sour cherry cultivars were recorded in higher concentrations both in 1507 and 1525 cultivars for all elements. In low organic matter and slightly alkaline soil conditions, most of sour cherry cultivars contained Zn in deficiency level and most of cultivars also contained low N levels in leaf tissues. Nitrogen and Zn are likely to be a major component of fertiliser programme for evaluated cultivars in possible cultural conditions. Application of these data in future studies has potential utility within the fields of agro-biodiversity conservation and nutrition of sour cherry cultivars.

Keywords: *Cherry cultivars, mineral status, genotypic variability.*

EFFECTS OF *TRICHODERMA HARZIANUM* ON YIELD AND SOME QUALITY PARAMETERS OF TOMATO

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Abstract

Using biological materials instead of chemical pesticides is an important subject for sustainable agriculture. *Trichoderma harzianum* is a fungus that can be used as microbial fertilizer as it develops many mechanisms for the enhancement of plant and root development. Thus, this research has been carried out to determine the effects of *Trichoderma harzianum* applications on yield and some quality parameters of tomato (cv.H-2274). Tomato seeds (cv. H2274) were divided into 3 groups and one group was treated with *Trichoderma harzianum* before sawing. The other group was treated before the seedling planting and the last called as control group was planted with no treatment. Additionally half of the seedlings in each group were sprayed with iprodione in 5-6 leaves stage. Analyses of ascorbic acid, phenolic compounds and total soluble solids content and physıologıcal parameters as fruit weight, fruit length, fruit diameter, fruit firmness and marketable fruit rate were determined for each applications. The highest yield was obtained from the plants which *Trichoderma harzianum* applied and iprodione treated during the seedling stage.

Keywords: *Trichoderma harzianum, H-2274, yield, iprodione, seedling.*

EFFECT OF LOADING POSITION AND STORAGE DURATION ON THE MECHANICAL PROPERTIES OF DEVECI PEAR VARIETY

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Abstract

In the study, the mechanical properties of Deveci pear were examined in terms of storage time and loading position. The experiments were conducted in two stages; the first experiment was carried out immediately after the harvest and the second experiment was carried out after 30 days in cold storage. The mechanic properties of the pear fruit such as rupture force, deformation, rupture energy and firmness were examined on the fruit's bloom side, lateral side and stem side. Furthermore, the size, sphericity, mass, amount of soluble solids and volume of the pear fruit were determined. The relationship between the sides of the fruit and firmness was found as statistically significant ($P<0.001$).

Keywords: *Pear, mechanical properties, rupture force, rupture energy, firmness.*

EVALUATION OF SPECTRAL PROPERTIES OF SUNFLOWER THROUGHOUT A GROWING SEASON

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Abstract

Agriculture is one of the sector that widely use remote sensing (RS) techniques. Crops can be monitored effectively throughout their growing seasons using RS techniques. Especially, satellite images enable accurate monitoring of numerous properties of crops in a big scale agricultural land, depending on the satellite frequency and image resolution. However, since implementation of this type of monitoring and assessment process in application, it is necessary to know relationships between crop properties and remotely sensed data. Therefore, research studies including measurements of spectral data in the field are very important. In this study, spectral reflectance properties of sunflower were measured using a spectroradiometer throughout a growing season. This study was conducted in some sunflower fields of three villages of Amasya-Merzifon county of Turkey. The areas of those fields varied between 0.2 and 5.0 ha. Measurements were made for 64 different points and on 8 different days between May and September 2016. These spectral reflectance data were evaluated by using the Normalized Difference Vegetation Index (NDVI), Soil Adjustment Vegetation Index (SAVI) and Simple Ratio (SR) which are extensively referred to in the literature. Results indicated that spectral reflectance values, depends on the vegetation amount, growth level and spectral indexes were increased from May to July. However, after mid-July, spectral vegetation indexes tended to decrease due to ripening of sunflower. Consequently, it is possible to conclude that sunflower crop can be monitored by using spectral reflectance data measured through field level spectroradiometer.

Key words: *Spectral reflectance, spectral vegetation index, remote sensing, sunflower.*

EFFECT OF DIFFERENT APPLICATIONS ON DWARFING OF FIG NURSERY TREES (FICUS CARICA CV. "BURSA SIYAHI")

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Abstract

The study aiming to specify the effects of different applications on Bursa Siyahı variety of fig nursery trees for dwarfing was performed during 2012-2013 in the experimental plot of Department of Horticulture, Agriculture Faculty of Adnan Menderes University in Aydin (Turkey). Beside the control application, for the purpose of creating artificial dwarfing on the fig nursery trees, one gibberellic acid inhibitor, Prohexadione-calcium (Pro-Ca), was equally used as 125 and 250 ppm. Also, the application of branch bending was performed on nursery trees which were curvedly planted on 30° angle with ground level which were cultivated by strapping to galvanised wires. Applications of 125 ppm Pro-Ca + branch bending and 250 ppm Pro-Ca + branch bending were also used in the study and yet, totally six applications were attempted. The fig nursery trees were planted 1*1.5 m distances on plots where branch bending was applicated, with 1 * 1 m interrow and intrarow distances on plots where the other applications were made. Pro-Ca applications, in the period when new shoots on saplings became 5 cm tall, were performed twice in growing season. For the purpose of specifying the effects on dwarfing of the applications, the parameters of nursery trees leaf, stem and root growth were examined. When the results of the study were generally reviewed, by uses of 250 ppm Pro-Ca application and 250 ppm Pro-Ca + branch bending application,poorer growth criteria nursery trees were taken in comparison with control group nursery trees.

Key words: *Dwarfing, figs, Turkey.*

DETERMINATION OF SOME PHYSICAL AND CHEMICAL PROPERTIES OF WALNUT (*JUGLANS REGIA L.*) GENOTYPES FROM SELECTED NATIVE IN THE UŞAK, TURKEY

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Abstract

This study was conducted to determine genetic variability and select superior walnut types within seedling population in the period 2015-2017 in the Uşak province (Turkey). During the study, walnut seedling trees were evaluated for late flowering, lateral bud fruitfulness, blight and antracnosis tolerance and high quality fruits. In the study, large number of walnut genotypes in Uşak was screened according to selection criteria and, after evaluation, 53 promising walnut types were selected as cultivar candidate among genotypes. In the selected genotypes, fruit weight ranged from 6.00 to 14.12 g, kernel weight ranged from 2.15 to 8.09 g and kernel percent varied from 35.80 to 57.30%. Fruit length of selected types were found between 26.14 and 42.47 mm, fruit width between 23.40 and 32.21 mm, fruit height between 24.22 and 34.53 mm, shell thickness between 1.47 and 3.23 mm. Ease of kernel removal of selected types were found generally easy and medium, and intensity of kernel color were generally found light. The contents of protein (12.38 - 23.50 %), fat (54.68 - 68.34%) and ash (1.00 - 2.92 %) were determined as the quantity in the selected genotypes. In conclusion, some of these selected genotypes can be recommended for the farmers in the region.

Keywords: *Walnut, Fruit properties, Genetic resources, Selection, Uşak.*

MINERAL NUTRIENT STATUS OF ALMOND *(PRUNUS AMYGDALUS* L.) ORCHARDS GROWING IN THE UŞAK (TURKEY) PROVINCE

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Abstract

This experiment was carried out in almond orchards growning in Uşak province (Turkey). For this experiment, 49 almond orchards were selected from all districts. In experiment orchards, soil samples were taken only in 2014, while almond leaves were sampled in both 2014 and 2015. By comparing the results of soil and leaf samples with boundary values, it was attempted to determine feeding problems and conditions of nutrient elements of investigated orchards. According to the results, it was found that the soils of experimental area were loamy (37%) and clay loam (63%) in texture. The soils did not have salinity problem. It was determined that there was a problem of lime in the orchard of about 64%, and pH was mainly slightly alkaline. Organic matter contents of soils were of medium levels. It was also found that 80% magnesium, 88% phosphorus, 96% zinc and 100% potassium of almond orchard soils had insufficient levels. According to the results of leaf analysis, 69% for phosphorus, 55% for magnesium, 71% for iron, 80% for zinc and 63% for copper concentration of almond leaves had no sufficient levels.

Keywords: *Almond orchard, Soil and leaf analysis, Mineral nutrition.*

ALTERNATIVE FORAGE CROP FOR ANIMAL FEEDING FOR ARID AND SEMI-ARID AREAS :SWITCHGRASS (PANICUM VIRGATUM L.)

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Abstract

Switchgrass is a perennial warm climate plant that use water effectively with a deep and strong root system. It is resistant to drought and it can be grown in marginal areas. Planting from seed is cheap and easy, and improves the soil structure and yield for 10-15 years. In the world animal nutrition, erosion prevent and energy plant has been used for decades Despite a significant increase in livestock production in the Konya region in recent years, forage has a low grass yield. Most of the material used in animal feeding is grown in irrigated areas. In irrigated areas, a decrease in the number of underground water resources increases both the cost and the risk of animal nutrition. It is important for sustainable animal nutrition that new feed crops are grown with less water, can be harvested for many years at lower cost in marginal areas, and can adapt to the fragile climate of the region in increasing number of animals. Many studies have been carried out in the world and in our country on the sustainability of animal feeding, especially in arid and semi-arid areas. Switchgrass is important for the region because it has the ability to produce biomass in quality and quantity that can be used as animal feed. Since 2008, in our country, Konya ecology in ongoing studies have taken in irrigation conditions 2-3 ton / da and in dry conditions 500-700 kg / da of dry biomass with 10% protein. It is expected that the Konya region will continue to produce and study this plant, which has not yet been wider cultivated in our country.

Keywords: *Animal nutrition, switchgrass, feed crops, dry and semi-arable fields, Konya.*

EFFECTS OF FRUIT CALIBRATION ON STORAGE TIME AND FRUIT QUALITY OF PEACH (CV. ELEGANT LADY AND R7)

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Abstract

Because of the fruit characteristics, peach storage is limited and somewhat problematic. In this study, the "Elegant Lady" and "R7" peach varieties were grouped into three different calibrations, (15, 20 and 22 cm) before being taken to storage in order to determine the effects of fruit calibrations on storability. The fruits were pre-cooled for 24 hours at 5°C in whether the fruit size had any effect on the quality characteristics during storage. Fruits were kept for two weeks at 85-90% relative humidity conditions and fruit quality analyzes were performed weekly. The effect of the fruit size on the flesh firmness varied in terms of varieties, whereas small size fruits had better values than those large sized. While there were differences between the calibers in terms of the quality characteristics (Total soluble solids, pH, Titretable acidity, weight loss, color, phenolic compounds) examined, the effect of the calibration was also important in terms of the storage time.

Keywords: *Peach, storage, calibration, quality.*

EFFECTS OF DIFFERENT SALT CONCENTRATIONS ON GERMINATION IN COWPEA (VIGNA UNGUICULATA L.)

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Abstract

Today, the importance of legumes is even more important as the weather's ability to bind free nitrogen to the soil, environmentalism and the importance of sustainable agriculture. The amount of nitrogen the edible legumes attach to the soil varies depending on the variety and environmental conditions, and is generally around 5-20 kg/ha per year. Cowpea is a leguminous plant with a consumption shape like bean, and it is a plant that will not live in harmony with the consumer's consumption in the regions where beans are grown. Cowpea is a plant that is regarded as animal feed besides human nutrition. Salt stress limits product yield by affecting plant growth, especially in arid and semi-arid regions The amount of excess fertilizer which is used in the construction of agriculture cannot be taken by plants and causes them to be salted. In Turkey, there are about 1.5 million hectares of salinity and alkalinity problems. This is equivalent to about 32.5% of the land suitable for irrigation. This study was undertaken to determine the physiological responses of the cowpea, to show that the salt stress faced in increasingly salty soils has been shown during the germination phase. In this study, the effects of 5 different salt doses (0-50-100-150-200 mM) on germination were tried to be determined in cowpea. The germination rate, plumula fresh and dry weight, radicula fresh and dry weight, plumula length and radicle length characteristics were investigated. As a result of the study, a decrease in germination rate was observed in increasing salt concentrations.

Keywords: *Cowpea, Germination, Salinity.*

TEMPERATURE AND WATER REGIME AFFECTS GERMINATION AND SEEDLING PROPERTIES OF FENUGREEK

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Abstract

Fenugreek (*Trigonella foenum-graecum*) is an annual legumetraditionally used as a spice, dye, forage, medicinal etc. It includes high crude protein and nitrogen fixation in the soil. The objective of this study was to assess the effect of temperature (3, 6, 9 ^{0}C) and water (I wet-days/week, II wet-days/week, III wet-days/week, IV wet-days/week) regimes on germination and seedling properties of fenugreek in growth chamber. The experiment was arranged in completely randomized experiment design with five replications. Each replication consisting of 25 seeds were placed in a petri dish, there after daily observing recorded during 30 days. During the experiment, plant and root height, dry matter, pH and electrical conductivity properties were examined. As the temperature increased, germination and seedling properties of fenugreek were affected positively compared to the lower temperatures. The germination and seedling properties of fenugreek were also affected by the water regimes. Temperature and water regime interactions were significant for the most of investigated parameters. As a result of this study, there is need for higher temperature and high water content for germination and seedling properties of fenugreek.

Keywords: *Temperature, water regimes, germination, seedling.*

CROSSBREEDING BETWEEN PEA SPECIES

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Abstract

Today, the genus *Pisum* L. has 3 species (*P. sativum* L., *P. abyssinicum* A. Braun ve *P. fulvum*). *Pisum sativum* L. subsp. *sativum* var. *sativum* (the field or garden pea), subsp. *elatius* (Bieb.) Aschers. & Graben, subsp. *abyssinicum* A. Br. and *Pisum fulvum* Sibth. & Sm. It is known that interspecies hybridization has more variation. Hybridization was performed with different combinations between *P. sativum, P. elatius, P. abyssinicum* and *P. fulvum* (Such as*; P.sativum X P. abyssinicum, P. sativum* X *P. fulvum, P. fulvum* X *P. sativum, P. abyssinicum* X *P. fulvum* etc.). It has been generally observed that the characters affecting yield are stronger in F1 plants as a result of the hybridization (like plant height, pod size, pod number). The predicted short internode character feature, which is expected to affect plant yield positively, was observed in the F2 hybrids (*P. sativum* L. cv. Araka X *P. fulvum*). In hybrids with short internode, more flowers and more pods are inevitable. However, the shortness of the length of these hybrid plants observed makes them difficult to use directly. Therefore, it is expected and desired that the internode character is to be worked with the plant height and pod size in order to benefit from the efficiency of the pea.

Key words: *Pisum species, crossbreeding, internode, interspecies.*

WINTER FIELD CROPS WITH TAP ROOT SYSTEM VERSUS CEREAL CROPS WITH FIBROUS ROOT SYSTEM AT EARLY AND LATE GROWTH STAGES

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Abstract

This study aimed to investigate some root and shoot traits in 8 different winter species with tap roots (Hungarian vetch, safflower and pea) and fibrous roots (wheat, barley, triticale, oats and rye) at long tubes under field weather conditions. Plants were harvested at beginning of stem elongation and grain filling stages of cereal crops. It was found significant differences between winter field crops in terms of root and shoot traits. The investigated traits per plant varied among the species at early and late growth stages respectively, ranging from 84.7 to 127.7 cm and 84.5 to 166.0 cm for root length, 0.3 to 5.9 g and 2.4 to 11.9 g for root biomass, 0.3 to 5.7 g and 5.5 to 29.8 g for shoot biomass. Significant rate of roots in 0-20 cm and 0-80 cm, respectively constituted with 52.3 to 81.4 % and 86.1 to 99.6 % at early growth stage and 27.7 to 75.2 % and 69.7 to 96.5 % at late growth stage. The study results showed that crops with tap roots had shorter root length, lower root and shoot biomass than cereals with fibrous roots at early and late growth stages.

Keywords*: Winter field crops, Fibrous and tap root system, Root and shoot, Growth stage.*

DO HUNGARIAN VETCH AND PEA HAVE SHORTER ROOT LENGTH AND LESS ROOT BIOMASS THAN WINTER CEREALS AT POST-FLOWERING?

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Abstract

This study was carried out to find out root biomass distribution with root and shoot traits of winter pea and Hungarian vetch with tap root and winter cereal crops with fibrous root such as wheat, barley, triticale, oats and rye at long tubes under field weather condition. Invastigated traits among the winter crops per plant varied from 94.7 to 136.7 cm for root length, 2.3 to 9.1 g for root biomass, 2.2 to 28.5 g for shoot biomass, 0.34 to 1.95 for root to shoot ratio and 24.9 to 62.4 % for root to total biomass ratio. Root biomass distribution among the winter field crops was ranged from 26.4 to 80.7 % at 0-20 cm, 42.4 to 87.4 % at 0-40 cm, 50.1 to 94.9 % at 0-60 cm and 71.8 to 98.8 % at 0-80 cm. Hungarian vetch indicated lower root biomass distribution at top soil compared to pea and cereal crops. Accordingly, winter pea and Hungarian vetch had shorter root length and lower root biomass compared to winter cereal crops.

Keywords: *Root length, Root biomass, Root distribution, Field crops.*

ROOT AND SHOOT CHARACTERISTICS AT DIFFERENT GROWTH STAGES OF CEREAL CROPS

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Abstract

This study was conducted to investigate some root and shoot traits in five winter cereal crops such as wheat, barley, triticale, oats and rye at three different growth stages under greenhouse conditions. It was found significant differences between genotypes in terms of root and shoot traits. Shoot traits per plant varied among the species at beginning of stem elongation, post-flowering and grain filling stages respectively, ranging from 1.0 to 3.7, 5.0 to 13.0 and 7.3 to 15.7 for tiller number, 0.17 to 0.50 g, 0.89 to 3.06 g and 3.7 to 6.4 g for shoot biomass. In stem elongation, post flowering and grain filling stages, root traits per plant were ranged from 7.3 to 11.7, 13.7 to 31.7 and 26.0 to 40.0 for crown root number, 0.32 to 0.46 g, 1.7 to 3.5 g and 1.1 to 2.3 g for root biomass. Root to shoot ratio and root proportion in total biomass reduced at grain filling stages compared to stem elongation and post-flowering stages. The study results also indicated that rye generally had high root and shoot traits, while oats was lower values than wheat, barley and triticale.

Keywords: *Cereal, Growth stage, root, shoot.*

THE EFFECTS OF SPRING AND AUTUMN SOWING ON YIELD AND SOME MORPHOLOGICAL CHARACTERISTICS IN FENUGREEK (*TRIGONELLA FOENUM-GRACEUM* L.)

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Abstract

This study was conducted to determine the optimal sowing period of fenugreek (*Trigonella foenum-graceum* L.) in Yozgat (Turkey) ecological conditions, to investigate the effect of spring and autumn sowing on yield and yield components of fenugreek at Research and Application Area of Gedikhasanlı, Faculty of Agriculture, Bozok University during 2014-2015 vegetation period. According to results of this research, plant height 46.58 cm, 32.42 cm, the number of pods per plant 16.73 number, 6.65 number, the number of seeds per pod 9.75 number, 5.27 number, thousand seed weight 30.17 g, 24.72 g, seed yield 310.93 kg/da, 154.23 kg/da, biological yield 819.92 kg/da, 791.31 kg/da, oil yield 14.45 kg/da, 6.61 kg/da and protein ratio 30.04%, 29.74% were recorded in autumn and spring sowing, respectively. The effect of autumn sowing on all investigated properties was positive and, except for biological yield and protein ratio, significant statistically.

Key words: *Fenugreek, Trigonella foenum-graceum L., autumn sowing, seed yield.*

INFLATING COATED GREENHOUSE DEVELOPMENT

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Abstract

In the study, it has been tried to do thermal insulating efficiency of greenhouse and adaptedness for the purpose of decreasing heating costs which is an important expense in greenhouse activities by being designed a new type of top dressing with present equipments and suitable construction to this top dressing. After modelling with stereo drawing programme of greenhouse, its installation in the field has been realized. It is provided that pressure and pneumatic circuit stands in balance by be being aerate with certain pressure among top dressing layers which are designed as double-layer. Temperature and PAR (Photosynthetic active radiation) have been measured comparatively with data logger and quantum PAR sensor, in cold-start conditions, synchronously, in greenhouse and out of greenhouse, also in different greenhouses covered with monolayer PE. As the result of calculations made by assuming that homonomous greenhouse has been covered with monolayer top dressing, it was understood that puffing top dressing decrease the heating loss at the rate of 67.8% in comparison to monolayer top dressing. As a result of measurement which was made, it was seen that the daily total PAR rate changed between 2500 - 16000 $\mu mol.m^{-2}.day^{-1}$ along with the change in total sunny hours. When compared to a greenhouse covered with monolayer PE, it is understood that there is no difference between PAR and potential temperature.

Keywords: *PAR, greenhouse, heat, insulation.*

EVALUATION OF BREAD WHEAT (TRITICUM AESTIVUML.) GENOTYPES BASED ON BIOTIC STRESS FACTORS AND AGRONOMIC CHARACTERS

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Abstract

The aim of the study was to investigate the correlation between/among some quality parameters, grain yields and biotic stresses under field conditions in some advanced bread wheat genotypes. The experiment was conducted in randomized completely blocks design with four replications at Trakya ARI experimental area, Edirne (Turkey), during 2013-2014 and 2014-2015 growing years. Grain yield, days of heading, plant height, lodging resistant, 1000-kernel weight, test weight, protein ratio, leaf rust, stripe rust, septoria leaf spot and relationship among these parameters were investigated. The results of experiment showed that there were statistical differences among genotypes based on yield and other parameters. The highest grain yield was determined in Gelibolu with 835.1 kg/da and mean yield was 781.1 kg/da. The highest test weight, 1000-kernel weight and protein ratio were determined in Aldane cultivar. Aldane and TCI011322-8 genotypes were found very tolerant to leaf rust and stripe rust in both years under field condition. The correlation coefficient was different between yield and other traits under various leaf disease infections. We observed negative correlations between grain yield with leaf rust and stripe rust in both growing seasons. Grain yield was positively correlated with 1000-kernel weight in both years. Also, negative relation between yield and plant height was found. Leaf rust was negative correlated with protein ratio in 2013-2014 (r=-0.746**) and in 2014-2015 (r=-0.554) growing year. Slightly negative correlation between stripe rust and protein ratio was determined, due to the lower infections of stripe rust disease in these seasons. The test weight of genotypes had significantly positive correlation with 1000-kernel weight in 2014 (r=0.599*), and in 2015 (r=0.918**). These results indicated that the correlations among biotic stress infections and agronomic characters varied depending on environment conditions and genotypic traits.

Keywords: *Bread wheat, genotypes, yield, agronomic characters, biotic stress.*

YIELD AND QUALITY OF BREAD WHEAT (TRITICUM AESTIVUM L.) MUTANT LINES AND RELATION AMONG TRAITS

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Abstract

The aim of this study was to develop new mutant line(s), which combines some features with their structure, such as moderate and/or high yielding, semi dwarf, early maturity and leaf disease tolerance, using local bread wheat (*Triticum aestivum* L.) cultivar of Selimiye and some advanced lines. For this purposes, Selimiye cultivar, TCI2066 and three sisters' line of TCI2021 were irradiated with 200 Gy gamma rays. This experiment was conducted in Edirne, Turkey, during 2012-2013 and 2013-2014 growing year with 25 advanced mutant lines and local check in randomized completely blocks design with four replications. Grain yield, thousand kernel weight, test weight, protein content, hardness, days of heading, plant height, leaf rust, net blotch, and relationship among these parameters were investigated. The results of variance analysis showed that there was statistical difference among genotypes. As a result, the highest grain yields were determined in mutant line Selimiye M1-2 and Selimiye M1-3 with yield of 822.9 kg/da and 810.4 respectively. Also, two mutant lines exhibited higher yield and some lower compared with mother line TCI2066-9, and four mutant lines of TCI20121-12 had higher yield potential. The highest protein was obtained from three mutant lines compared with Selimiye, one mutant line from TCI2066-9, TCI2021-12 and TCI2021-21. A strong positive correlation was determined between grain yields with TKW, TW in both growing seasons. Grain yield was significantly negatively correlated with days of heading. Also, TKW was negatively correlated with protein ratio and grain hardness, while positively correlated with test weight. As for the infection of leaf rust and Septoria, their effects varied depending on environment conditions and genotype. Both leaf diseases negatively affected protein ratio in mutant lines. The results of this study showed that some mutant lines were developed having higher yield and its component and protein ratio. So, mutation breeding is a breeding tool, which could be used successfully in bread wheat breeding study.

Keywords: *Bread wheat, mutation, yield, quality characters.*

CHARACTERIZATION AND EVALUATION OF SOUR CHERRY (*PRUNUS CERASUS* L.) GENETIC RESOURCES IN AEGEAN REGION OF TURKEY

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Abstract

A wide range of 'Kütahya' sour cherry germplasm was collected from the most important growing regions in Turkey. Today the diversity of the earth's plant life is under threat as never before. In agriculture, the widespread adoption of a few improved varieties has narrowed the genetic base of important fruits and led to the disappearance of hundreds of landraces. The purpose of this study was to determine the phenological, pomological and technological characters of 29 sour cherry (P. cerasus L.) types collected from Aegean Region of Turkey. The types were evaluated for the characters of first blossoming, full bloom, end of blossoming, harvesting time, yield, fruit weight, fruit flesh/seed, juice content, total soluble solids/acidity, pH, juice colour, fruit shape, skin colour, aroma and attractiveness. It was found that the earliest blooming type was 1528, which usually blooming at the end of March. First blossoming date of types was between 27 March and 17 April. The period from the beginning of blooming to the end of blooming was 20 days, changing from year to year. Harvesting time began in the beginning of June. The earliest ripening type was 1528. The types that ripen late were 1533 and 1539 about end of June. Harvesting period was approximately 20 days. Fruit weight of the accessions ranged between 3.3 g and 5.9 g, sample 1514 with the highest and sample 1538 with the lowest weight. Average fruit weight was around 4.0 g.-5.0g where 65% of types were placed between the variation limits of 4.0 to 5.0 g in fruit weight. Four different colours were observed for fruit skin. The colour of fruit skin ranges from cherry, dark cherry, dark red to light cherry. There was certain amount of variabilities among sour cherry types which were collected from Aegean Region.

Keywords: *Evaluation, sour cherry, genetic resources.*

EFFECT OF PLANTING DATE ON FATTY ACID COMPOSITION OF SOYBEAN [*GLYCINE MAX* (L.) MERR.] IN SOUTHERN TURKEY

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Abstract

The fatty acid composition of soybean seed oil varies depending on genotype, climatic conditions, growth location, and interactions between these factors. The field experiment was conducted during cropping season of 2014 at the experimental farm of the Faculty of Agriculture, University of Dicle, Diyarbakir (Turkey) to evaluate the effect of time of planting on fatty acid composition of soybean [*Glycine max* (L.) Merr.] varieties. The experiment was laid out in split-plot design with three replications. The treatments consisted of five sowing dates (May 1, May 20, June 10, June 25 and July 5) as main-plot and four varieties of soybean (Atakişi, Arısoy, Blaze and Nazlıcan) as sub-plot making a total of 20 treatment combinations. The results showed that oleic (C18:1) acid content decreased, whereas, linoleic (C18:2) and linolenic (C18:3n6) acid contents increased with delay in sowing time. Ratio of oleic to linoleic acid did not change up to July 10, however it decreased significantly when planting delayed to the end of June or early July. With regard to varieties, Blaze and Nazlican were high in palmitic acid (11.42% and 11.39%, respectively) and total unsaturated fatty acids (82.81% and 83.21%, respectively) for all sowing dates. The highest oleic acid content was found in Arisoy (30.24%). The results show that sowing time has a marked effect on the fatty acid composition of these soybean varieties.

Keywords: *Soybean, Fatty acid composition, Sowing date, Variety.*

EFFECT OF PLANTING DATE ON YIELD, YIELD COMPONENTS AND OIL CONTENT OF SOYBEAN [*GLYCINE MAX* (L.) MERR.] IN SOUTHERN TURKEY

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Abstract

The field experiment was conducted during cropping season of 2014 at the experimental farm of the Faculty of Agriculture, University of Dicle, Diyarbakir (Turkey) to evaluate the effect of time of planting on yield and yield components of soybean [*Glycine max* (L.) Merr.]. The experiment was laid out in split-plot design with three replications. The treatments consisted of five sowing dates (1 May, 20 May, 10 June, 25 June and 5 July) as main-plot and four varieties of soybean (Atakişi, Arısoy, Blaze and Nazlıcan) as sub-plot making a total of 20 treatment combinations. Results obtained showed that the tallest plants were produced from May sowings giving the highest value of 87.7 cm in 20 May and 86.7 cm in 1 May. These treatments also performed better in pod number per plant statistically at par with 5 July planting. However, the planting dates of late June and early July gave the highest 100-seed weight (14.44 g and 14.46 g, respectively). Arısoy genotype gave the highest seed yield when planted in late sowings (2660.3 kg ha^{-1}). It is therefore concluded that seeds of last date (July 5) and Atakişi genotype were recognized by high oil content (22.7% and 22.4%), respectively. Our results indicate that there was no seed yield or oil content reduction when the sowing time was delayed to the early July in southern Turkey.

Keywords: *Soybean, Yield, Yield components, Oil content, Sowing date, Variety.*

FRUIT QUALITY CHARACTERISTICS OF DIFFERENT PERSIMMON CULTIVARS GROWING IN SAMSUN PROVINCE (TURKEY)

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Abtract

This study was carried out to determine fruit weight, fruit lenght, fruit diameter, fruit width, flesh firmness, color characteristics (L*, chroma, hue angle), pH, soluble solids content and titratable acidity of 3 persimmon cultivars (Irem, Ayder and Onur) grafted on *Diospyros lotus* rootstock growing in climate condition of Samsun district, Turkey. According to study results, the highest value of fruit weight was determined in Irem cultivar (302.38 g) and the lowest was found in Onur cultivar (237.14 g). While the lowest fruit dimension characteristics were observed in Onur cultivar, the highest was observed in Irem cultivar. Onur cultivar (83.60 N) had the highest fruit firmness and Ayder cultivar had the lowest one (74.96 N). The highest soluble solids content and titratable acidity were obtained from Irem cultivar (%12.10 and %1.66, respectively). While the lowest pH value was found in Irem cultivar (5.65), the highest was found in Ayder cultivar (5.85). Consequently, Irem cultivar has generally the highest values in terms of fruit quality characteristics.

Keywords: *Cultivar, fruit weight, flesh firmness, soluble solids content.*

THE EFFECTS OF POTASSIUM FERTILIZATION ON THE PLANT HEIGHT, CHLOROPHYLL CONCENTRATIONAND AND NUTRIENTS UPTAKE OF YOUNG CORN PLANTS ROOTS UNDER WATER STRESS CONDITIONS

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Abstract

The study was designed to carry out as pot experiment conducted to determine the impacts of different potassium fertilizer doses applied to corn grown under water stress on plant development, chlorophyll concentration, and some plant nutrient uptake from corn plants roots. The experiment was established as randomized blocks with three replications. In this research, three different irrigation levels were planned. These are 50 %, 75 %, and 100 % and three different potassium doses (0 ppm K, 100 ppm K, and 200 ppm K) were given to young corn plant. The plant height measurements were showed; 200 ppm K fertilization gave the best results by average plant height of 187 cm. As water stress conditions increase, plant growth and development decreases. The negative conditions of water stress are reduced by potassium fertilization. The chlorophyll concentration decreased under stress conditions. Nitrogen and potassium contents of the plant root decreased as irrigation water decreased and increased as potassium fertilizer applied increased. This work suggests potassium fertilization to our farmers who agricultural production in arid areas. Potassium element improves drought conditions by holding water in the plant cells.

Keywords: *Corn plant, water stress, potassium fertilizer.*

EFFECTS OF DIFFERENT SALT CONCENTRATIONS ON GERMINATION IN BEAN

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Abstract

Edible legumes that constitute the main source of plant protein are very important for the world and our country. Legumes are cultivated in terms of cultivation area and production, after cereals in cultivation of field crops. Beans are in the first place in edible legumes due to planting area and production in the world. Salinity is one of the environmental factors that significantly limits the production of nutrients by risking fertile agriculture in our world, along with the growing human population. Every year in the world, 10 million hectares of land is being cleared due to salinity. In this study, the effects of 5 different salt doses (0-50-100-150-200 mM) on germination were tried to be determined in bean. The germination rate, plumula fresh and dry weight, radicula fresh and dry weight, plumula length and radicle length characteristics were investigated. As a result of the study, a decrease in germination rate was observed in increased salt concentrations.

Keywords: *Salt, Bean, Germination.*

DETERMINATION OF EFFECTS OF CALCIUM APPLICATIONS BEFORE STORAGE ON PHYSICAL AND CHEMICAL PROPERTIES OF POTATO AT STORAGE CONDITION

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Abstract

Potato begins to conversation sugar from starch for shoot growth at store while storage period of potato after harvest are increasing. It doesn't need sprouting of potato begins at store before planting time. If this condition occurs, soil growing performance of potato can be effected negatively. Chemical changes of potato tuber stored for edible consuming reduce market and nutrient rate of potato. Some applications have been applied from outside before storage can reduce chemical and physiological losses during storage. In this research, it aims to can be reduce negative changes at ingredient of potato and can be keep storage losses at minimum level during storage with calcium (Ca) applications to skin of potato tubers. This study was conducted with three replications at *randomized parcels design factorial at cold storage with* +4 °C temperature and 85-90% moisture. Solution of 5 different Ca doses (0%, 5%, 10%, 15%) was applied to tubers. Tubers at control group were kept in pure water and tubers at Ca application group were kept in solution of the doses during 1 hour. Physical changes like weight losses of tubers, shooting tubers, shoot heights of tubers and chemical changes like dry matter rate, C vitamin rate and bioactive compounds were examined during storage period. It was determined that maximum loses of tubers weight was founded at control group and increasing Ca doses reduced weight losses of tubers. At first, dry matter rate was 18, 28% at control group, then dry matter rate increased to 21, 97% after storage. Ca doses are viewed, 10% Ca application, first dry matter rate (19, 23%) increased at minimum levels after storage (20, 23%). It can be said that, with this research, Ca applications before storage can reduce losses of storage.

Keywords: *Storage, calcium, potato, dry matter, bioactive compounds.*

DETERMİNATİON OF HAY YİELD OF COMMON VETCH + CEREALS MİXTURES GROWN UNDER HAZELNUT ORCHARDS

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Abstract

Herbaceaus plants naturally grown in hazelnut orchards are utilised as hay or for animal grazing in Turkey. The aim of this study was to determine the hay yield of different common vetch + cereals mixtures sown under hazelnut orchards. Additionally, their weed supperision was determined. This study was carried out in two locations (Sinop and Giresun, Turkey). 50% common vetch + 50% oat and 50% common vetch + 50% triticale mixtures were sown. Also natural vegetation under trees was used as control. As a result, it is determined that hay yield of mixtures was considerably higher than in contol plot. And these mixtures suppressed weed under hazelnut trees.

Keywords: *Hay, yield, common vetch, cereals, hazelnut.*

TOXICITY OF ACHILLEA MILLEFOLIUM ESSENTIAL OILS AGAINST *SCLEROTINIA SCLEROTIORUM* AND *BOTRYTIS CINEREA*

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Abstract

In the present study, experiments were conducted to investigate fumigant toxicity of the essential oil from *Achillea millefolium* L. plants for *Sclerotinia sclerotiorum* and *Botrytis cinerea* in vitro conditions. The essential oils were isolated with the water distillation method by Neo-Clevenger apparatus. The final concentrations of the essential oils obtained from the plants were added to the Potato Dextrose Agar (PDA) at 2.5, 5, 7.5 and 10 µl doses. Mycelial disks of pathogens (6 mm in diameter) removed from the margins of 7 days old culture were transferred to PDA media containing the essential oils at tested concentrations. Five replicates were used per treatment. For each essential oils concentration, inhibition of radial growth compared with the untreated control was calculated after 7 days of incubation at 24±1°C, in the dark. *A. millefolium* essential oil showed the highest fumigant toxicity on *B. cinerea* (92.11%). The lowest fumigant toxicity on *S. sclerotiorum* showed *A. millefolium* essential oil for 2.5 and 5 µl doses (0.00%). Essential oils *A. millefolium* inhibited the mycelial growth of *S. sclerotiorum* and *B. cinerea* of mycelial growth of 10 µl dose of the pathogens by 38.11% and 92.11% respectively. It has been observed that the antifungal effect of the extracts increases with dose increase. As a result, at least micelle growth and the highest percent inhibition rate were obtained at 10 µl dose of the *B. cinerea*. *A. millefolium* essential oils can be used as a biological preparation.

Keywords: *Sclerotinia sclerotiorum, Botrytis cinerea, Achillea millefolium, Essential oils.*

PATH ANALYSIS OF YIELD AND QUALITY PARAMETERS OF CARNATIONS (DİANTHUS CARYOPHYLLUS L.) AT DIFFERENT IRRIGATION AMOUNTS AND INTERVALS

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Abstract

In this research, the relationships between yield and some quality parameters of carnation (Dianthus *Caryophyllus* L.) were determined by employing the correlation and path analysis at different irrigation amounts and intervals under the greenhouse conditions. Irrigation treatments consisted of three irrigation intervals (I_1: 1-, I_2: 2-, and I_3: 3-day) and five crop-pan coefficients (k_{cp1}: 0.25, k_{cp2}: 0.50, k_{cp3}: 0.75, k_{cp4}: 1.00, and k_{cp5}: 1.25). The results of the correlation analysis demonstrated that yield positively and significantly ($P<0.05$) correlated with stem length, stem diameter, flower diameter, node number, and stem weight. The path coefficient analysis depending on yield as a dependent variable showed that stem length, flower diameter and stem weight displayed high, positive, and direct effects. However, stem diameter and node number exhibited low, negative, and direct effects. Stem length and stem weight had the highest direct effectsat the rates of 44.25 and 40.17%, respectively.

Keywords: *Path analysis, Carnation, irrigation interval, Class A Pan.*

DETERMINATION OF ANTI-BACTERIAL ACTIVITIES OF *ACHILLEA MILLEFOLIUM* L.

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Abstract

This study was carried out to determine the antibacterial activity of the essential oil from *Achillea millefolium* L. on *Xanthomonas axonopodis* pv. *vesicatoria* (*Xav*). *Achillea millefolium* L. was collected in Yozgat province in Turkey. The essential oils were isolated with the water distillation method by using Neo-Clevenger apparatus. The final concentrations of the essential oils obtained from the plants were applied to petri dishes at 2.5, 5, 7.5 and 10 µl doses. The bacterial suspension (10^6 cells/ml) was spread on the NA (Nutrient agar) medium 100 µl in each one petri dish. The media without essential oil were used as the negative controls. Five replicates were used for each treatment. NA plates were then incubated at 26 ºC. The colony density of the bacterium was measured at the end of the 3-day incubation period. *A. millefolium* essential oil showed the highest antibacterial activity at 10 µl dose (82.20%). The lowest antibacterial activity was shown by *A. millefolium* essential oil at 2.5 µl dose (15.21%). The effects of other doses were determined for 5 µl (18.77%) 7.5 µl (62.13%), respectively. Based on the results of the study, an increase in the essential oil concentration resulted in the increase in the essential oil efficacy. To conclude, the essential oil from *Achillea millefolium* L. was found to have high antibacterial activity.

Key words: *Xanthomonas axonopodis* pv. *vesicatoria*, *Achillea millefolium L., essential oil, antibacterial activity.*

TAXONOMIC REVISION OF COLPODIUM TRIN. (POACEAE) AS ONE OF PASTUREGRASSES IN IRAN

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Abstract

Weeds in grassland could be known as valuable genetic sources that use as a Livestock nutrition. Nature conservation and sustainable development are provision of stable product for the present generation and sustainable production for future generation.*Colpodium*Train (Family Poaceae) has two species i.e.,*C. violaceum* and *C. versicolor*that grows in mountainous regions and mountainous pastures. *C. Violaceum* could be found beside rivers and clay-sandy river beds. In this study, the effect of drought stress on internal structure and micromorphological traits has been investigated. *Colpodium* has high diversity, structural complexity and intermediate characters and makes many taxonomic problems for taxonomists studying just on its morphological traits. Flora Iranica provides a description of the genera and identification keys for species.However, because of variability of morphological traits and intermediate traits there is some ambiguities in positions of taxa. Therefore, we studied on anatomical and micro-morphological characters. At first there were many trips to collect the plant samples after that other investigations such as morphological studies of leaves, micro-morphological studies of abaxial surface of leaves, lemma and gluma were also performed. In this study, assessment of different populations of each species indicated that some traits such as panicle shape and width that is described in Flora Iranica cannot be considered as taxonomic segregating traits. The most important fixed traits are existence of trichomes on the abaxial surface of lemma. We believe that Knowing what is in our pastures can guide us to maintaining valuable genetic resources as well as high quality pastures are key to high milk production in *grazing.*

Key words: *Colpodium Train, Anatomy, Micromorphology, Iran*.

EFFECT OF IODINE ON GERMINATION AND YIELD IN ROCKET (ERUCA VESICARIA) PLANT

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Abstract

Iodine is an essential trace element for human health and is involved in the production of the thyroid hormone. Recently, a new idea has emerged: to meet people's need for daily iodine by increasing the iodine content of vegetables. This study was carried out with iodine foliar application and root application methods to determine which application was more appropriate and to see the effect of iodine on germination. Germination experiments were conducted in an incubator according to a random block design, with 5 doses of iodine and five replicates. The yield experiment was conducted according to the same design in a greenhouse, with 5 doses of iodine, two application methods and three replicates. At the end of the germination experiment, the germination rate, root fresh and dry weight and root length were determined and at the end of the yield experiment, the plant fresh and dry weights were determined. The germination rate was not affected by the application. Root fresh and dry weight decreased with application doses. Applications reduced the root length by 50%, compared to the control plants. According to the yield results, the plant fresh and dry weight decreased with the increase in doses in two applications. It is important that no loss of yield occurred with the applications to increase the iodine content of the vegetables. After comparing foliar and root application methods, it is thought to be more appropriate to apply iodine by foliar spraying. In addition, the application dose should be selected carefully in order to avoid harming the plant.

Key words: *Iodine, Rocket, Vegetable, Thyroid.*

EFFECTS OF HUMIC ACID APPLICATIONS ON LETTUCE GROWTH AND ON SOME PROPERTIES OF SOIL CONTAMINATED BY CADMIUM

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Abstract

This study investigated the effect of humic acid on the growth of lettuce and on some properties of soil under Cd pollution conditions. This work was carried out at the agriculture faculty of Canakkale Onsekiz Mart University in Turkey. An experiment was conducted according to a random block design, in a greenhouse with four doses of humic acid (0, 4, 8, 12 L da^{-1}), three doses of Cd (0, 1.5 and 3 mg kg^{-1}) and three replicates. The source of humic acid application was "TKİ-Humus'', a trademarked product, and the "Yedikule-5701'' variety of lettuce was used. At the end of the experiment, the fresh weight (g) and dry weight (g) of the plants, leaf length (cm), leaf width (cm), soil reaction (pH), electrical conductivity (EC,µS/cm), and calcium carbonate (% of $CaCO_3$) were determined. The results were subjected to a one-way ANOVA in the MINITAB 17.0 statistical package program. Differences which were statistically significant according to the results of variance analysis of the variables/elements were compared with an LSD test. The humic acid application showed a statistical difference ($P>0.01$) for leaf length. A statistical difference ($P<0.05$) was also observed in the plant's fresh and dry weight and leaf width with regard to the interaction of the humic acid application and cadmium application. In contrast, no relationship was found between soil properties and humic acid except in the case of electrical conductivity. Humic acid and cadmium applications created a statistically significant difference ($P<0.05$) in electrical conductivity.

Key words: *Cadmium, Humic Acid, Lettuce, Soil*

NEEDS OF TEA GROWERS FOR PARTICIPATING IN TEA PRODUCTION INSURANCE: A CASE STUDY IN PHU THO PROVINCE, VIETNAM

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Abstract

The research has evaluated the situation of tea production of tea growers in Phu Tho Province, Vietnam. Average tea plantation area among the largest group of households is 0.61 ha. In production, the types of risks that tea growers encounter include: unfavorable weather (33.4%), diseases (13.2%), insects and worms (2.3%), capital (0.3%) and price which is the most major risk (50.8%). The survey of 1,000 tea growers identified that 46.7% of the households are in need to participate in tea production insurance. The average willingness to pay was estimated to be 2,407.07 (thousand VND/ha/year).If the agricultural program is successfully implemented in the province, it is estimated to have a total agricultural insurance fund of 34-35 billion VND/year. The survey results show that gender, education level, tea growing area and location are factors that affect the level of willingness to pay for agricultural insurance for tea trees. There are four solutions which are proposed to enhance the participation of tea growers in agricultural insurance for tea: (1) Development of an insurance product for the production of fresh tea leaves for easier access from farmers; (2) Active communication on agricultural insurance policy to local authorities, farmers' union, agricultural expansion stations and especially the farmers; (3) Close collaboration between local authorities and enterprises in the review on current mechanisms and policies to timely propose adjustments and supplements to meet the needs of farmers on agricultural insurance; (4) Strengthening coordination between the State, insurance companies, credit and financial institutions and farmers.

Keywords: *Agricultural insurance; Tea growing households; Tea production.*

TWIN ROW TECHNOLOGY MAIZE SOWING

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Abstract

This paper presents the results of the sowing o twine in twin row technology on Family Farm Jovic, Prud, municipality Odzak, Bosnia and Herzegovina, using the MaterMacc Twin row - 2 planter. Two hybrids were used: hybrid P0412 and hybrid BC 525 sown in standard sowing with a row spacing of 70 cm and twin row sowing with a spacing of double rows of 22 cm. Standard sowing was done with the pneumatic sowing machine Gaspardo SP-4, on the April 18th. The standard sowing of hybrid P0412 was performed on a predetermined set of 66355 plants per hectare. The estimated size of the plant was 60705 plants per hectare. The yield of this hybrid, harvested on September 26th, 2016, was 15798 kg with a standard deviation of 303,250 and a coefficient of variation of 1.92%. The yield of corn hybrids P0412 in sowing twin rows made by a set of roasted plants of 60528 plants was 16671 kg / ha or 5.53% more than standard sowing. The standard sowing of the hybrid BC525 was performed on a predetermined set of 66355 plants / ha. The estimate of drowned plants was 62658 plants per hectare. Yield of this hybrid in the berry was 14579 kg with a standard deviation of 1162,311 and a variation coefficient of 7, 97%. The yield of maize hybrids BC525 in sow Twin-row technology with a set of rotten plants of 68515 plants was 16613 kg / ha or 13.95% more than standard sowing.

Keyword: *Corn, sowing, twin wheat, yield.*

STUDY ON VARIATION AND ASSOCIATION OF GRAIN QUALITY TRAITS IN DURUM WHEAT GENOTYPES

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Abstract

Knowledge on variability and association of grain quality parameters is important for building an appropriate plant breeding strategy for improving these basic traits for durum wheat. The study was carried out to determine the variation and correlation of the following traits: protein content (PC), wet gluten (WG), yellow pigment and SDS sedimentation value of 24 durum wheat genotypes - varieties and breeding lines of different origin: Bulgaria (FCI – Chirpan, DAI - G. Toshevo), Europe, CYMIT - Mexico and ICARDA - Syria. All genotypes were grown under field conditions in competitive variety trial in three replications during three harvest years (2014 – 2016) in the experimental field of Field Crops Institute – Chirpan, Bulgaria. All parameters were evaluated on whole grains on standard methods. For statistical processing of the data variation analysis, analysis of variance (ANOVA) and correlation analysis were used. The variance component due to genotype explained most of the total variation for the traits: yellow pigment - 66.1 % and SDS sedimentation value - 92.9 %, while the variation of the PC is determined mostly by the environment (51.2 %) and the variation of WG – by the interaction between genotype and environment (45.24 %). Three Bulgarian breeding lines – M- 376 - 16, 26 %; M-6433 – 16,19 % and M-287 – 15,65 % are distinguished with the highest PC - average of three years. With regard to WG three breeding lines exceed foreign varieties DF-009114002 and Auradur, which have the highest values for this trait among all studied varieties. The foreign variety TD -97 is characterized by the highest YP - 9,83 %. All studied foreign varieties are characterized by stronger gluten and greatly exceed Bulgarian breeding materials with regards to the trait SDS. The greatest variation in the sample of the studied genotypes was found for traits YP and SDS. No statistically significant positive correlation was observed between protein and gluten content and gluten strength.

Key words: *Plant breeding, durum wheat, grain quality traits, variation, correlation.*

STUDY OF THE PERFORMANCE OF BREAD WHEAT CULTIVARS CARRYING THE 1BL.1RS WHEAT-RYE CHROMOSOMAL TRANSLOCATION WITH PHYSIOLOGICAL CRITERIA

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Abstract

The 1BL.1RS wheat-rye chromosome translocation offers to the host cultivar, among others, high yield potential and drought resistance. In order to study how the above traits are affected by this translocation, three Hellenic spring wheat varieties with translocation (cvs. Acheron, Elissavet and Orfeas) and six without the translocation (cvs. Apollonia, Acheloos, Vergina, Doirani, Nestos and Strymonas) were used. The Russian cultivar Kavkaz/Cgn was used as control. The complete randomized block design was applied with four replications and the experiment was established in the main farm of the Western Macedonia University of Applied Sciences in Florina. The following physiological traits were measured: total chlorophyll content, chlorophyll fluorescence, CO_2 assimilation rate, stomatal conductance, intercellular CO_2 concentration and transpiration rate. No significant differences were recorded except for total chlorophyll content. Cultivar Achellos, which does not carry the translocation and is characterized by high yield potential, differed significantly from all the other cultivars in total chlorophyll content. Regarding the other traits, cultivar Doirani performed better in stomatal conductance, cultivar Nestos in intercellular CO_2 concentration and cultivar Acheloos in transpiration rate, but the differences were not significant. In order to find out the effect of the physiological traits on yield potential the above results were compared to the yield performance of the corresponding cultivars. This comparison led to the conclusion that the 1BL.1RS chromosome translocation does not give an advantage regarding the physiological traits studied. Further research is required to confirm the results of the present study.

Keywords: *yield potential, drought resistance, chlorophyll, assimilation rate.*

EFFECTS OF METALLURGICAL SLAG AND ORGANIC FERTILIZER AMENDMENTS ON CHEMICAL COMPOSITION OF CHARD (BETA VULGARIS VAR. CICLA)

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Abstract

The aim of this study was to investigate the effects of application of Ca - containing metallurgical slag on chemical composition (macro and trace elements) of chard (*Beta vulgaris* var. *cicla*) aerial parts. The study was performed in semi-controlled glasshouse conditions, and the effects of metallurgical slag was compared to those of other lime materials (ground limestone and hydrated lime) in combination without and with standard mineral and organic (liquid fish) fertilizers. P was determined by spectrophotometer, K - by flame emission photometry and N, C, S - using elemental CNS analyzer Vario EL III. In the determination of Fe, Zn, Cu and Cd, atomic absorption spectrometry was used. The results of the paper indicate that all Ca-materials studied, including metallurgical slag, along with the studied fertilizers, showed positive effects on the content of main and beneficial biogenic macroelements in aerial biomass of the tested vegetable. There is a noticeably and statistically significant tendency of an increase in the content of P, K and S in tested plant in the treatment with liquid fish fertilizer in relation to other treatments. Regarding the concentration of trace metals in tested vegetable, there was not found higher accumulation of Fe in tested plants in the treatments where metallurgical slag was applied in spite of its significant content in this liming material. As for Cd, its concentrations were within the safety limits and allowed concentrations in all the treatments, which is a highly desirable outcome.

Keywords: *Metallurgical slag, lime materials, mineral and liquid fish fertilizer, acid soil, chemical composition, chard.*

WATER PRODUCTIVITY INDICES OF THE SOYBEAN GROWN ON SILTY CLAY SOIL UNDER SPRINKLER IRRIGATION

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Abstract

The objective of this research was to compare the effects of different irrigation treatments on soybean [*Glycine max* (L.) Merr.] productivity and water use efficiency on experimental fields of the Maize Research Institute of Zemun Polje(Serbia), in 2007 and 2008. Four irrigation levels were investigated: full irrigation (I_{100}), 65% and 40% of I_{100} (I_{65} and I_{40}) and a rain-fed (I_0) system. The crop water use efficiency (CWUE, also known as crop water productivity –CWP), irrigation water use efficiency (IWUE) and evapotranspiration water use efficiency (ETWUE) were used to assess the water productivity of each studied treatment. The efficiency of the same treatment differed between the years as it depended on seasonal water availability, weather conditions and their impact on seed yields. Maximum and minimum yields were obtained in the I_{65} and I_0 treatments, averaging 3.41 t ha^{-1} and 2.26 t ha^{-1}, respectively. Water use efficiency values were influenced by the irrigation levels. In general, CWUE values increased with the increased level of irrigation. In both growing seasons, IWUE and ETWUE decreased with increasing the seasonal water consumption and irrigation depth. On average, treatments I_{40} and I_{65} resulted in similar or higher CWUE and ETWUE than I_{100}, in both growing seasons. I_{65} resulted in the highest IWUE, averaged over the two seasons, while I_{100} had the lowest IWUE. I_{65} could be proper for the soybean irrigated in Vojvodina when there is no water shortage and I_{45} could be used as a good basis for reduced sprinkler irrigation strategy development under water shortage.

Keywords: *Limited irrigation, Crop water productivity, Crop water use efficiency*

INFLUENCE OF PSEUDOMONAS SPP. AND METALLURGICAL SLAG AMENDMENT ON MACROELEMENTS CONTENT IN *RADICCHIO* GROWN ON ACID SOIL

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Abstract

R*adicchio, Chicorium* spp. var. *rossa di treviso*, grows well in soils with a pH of 5.5 - 6.8, especially in well drainaged loose fertile soils which are rich in nutrients. Thus, if the cultivation of this plant is planned on the soils with high soil acidity such as Stagnosol, a necessary lime should be applied along with regular fertilization. The aim of this study was to investigate the influence of calcium containing metallurgical slag (MS), a by-product from a steel factory, as a potential liming agent on macroelement content in radicchio leaves. The effect of applied bacteria was also tested, knowing that some of the fluorescent *Pseudomonas* species are plant growth promoting rhizobacteria (PGPR) capable to colonize the plants roots, stimulate the growth and have antagonism towards phytopathogenic microorganisms. The study was performed through vegetative experiments in semi-controlled greenhouse conditions. Along with the slag, the effect of two indigenous PGPR strains from *Pseudomonas* genera, Q4 and B25, was tested through the following variants: V1: Control; V2: Strain Q4; V3: B25 strain; V4: Metallurgical slag; V5: MS+ strain Q4 and V6: MS + strain B25. P was determined by spectrophotometer, K - by flame emission photometry and total N and C by using elemental CNS analyzer Vario EL III, while Ca and Mg were determined by AAS. All treatments showed positive effects on plant and root yield as well as on elemental chemical composition of radicchio leaves, whereby the effect of variant with MS and Q4 strain was the most pronounced. In addition, this effect on N, K, Ca and Mg contents was statistically significant in relation to the control.

Keywords: *Pseudomonas strains, metallurgical slag, stagnosol, macroelements, radicchio.*

IMPACTS OF LIMING AND FERTILIZATION ON YIELD OF TWO TRITICALE VARIETIES

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Abstract

Acid soils have unfavorable physic-chemical properties. The aim of this study was investigate the impact of mineral, lime and organic fertilizers on grain yield of triticale on pseudogley. Investigations were carried out in the vicinity of Kraljevo (Serbia) during the 2011/2013. In the trial two varieties oftriticale and 10 fertilization variants (V1-N_{35} P_{60} K_{60}, V2- N_{60} P_{100} $K_{100,}$ V3- $N_{35}P_{60}K_{60}$ + 2.5 t/ha $CaCO_{3,}$ V4- $N_{60}P_{100}$ K_{100} + 2.5 t/ha $CaCO_{3,}$ V5- $N_{35}P_{60}K_{60}$ + 5 t/ha $CaCO_3$ and V6- $N_{60}P_{100}K_{100}$ + 5 t/ha $CaCO_3$, V7- $N_{35}P_{60}K_{60}$ + 2.5 t/ha $CaCO_3$ + 20 t ha^{-1} manure, V8- $N_{60}P_{100}K_{100}$ + 2.5 t/ha $CaCO_3$ + 20 t ha^{-1} manure, V9- $N_{35}P_{60}K_{60}$ + 5 t/ha $CaCO_3$ + 20 t ha^{-1} manure i V10- $N_{60}P_{100}K_{100}$ + 5 t/ha $CaCO_3$ + 20 t ha^{-1} manure) were included. The resulting data were analyzed using the analysis of variance. The application of all the variants of fertilization has led to a significant increase of grain yield compared to the control. The highest average yield of 4750 kg ha^{-1} was achieved at the variant with the highest dose applied mineral, lime and organic fertilizers. The average yield achieved using only triticale fertilizers was 2809 kg ha^{-1}. Average yield triticale achieved by using a combination of mineral and lime fertilizers was 3726 kg ha^{-1}. Combination of mineral, lime and organic fertilizers achieved average yields grain of triticale of 4463 kg ha^{-1}. The use of lime and organic fertilizers in combination with the mineral, the acid soils can achieve a satisfactory yield of triticale.

Key words: *mineral fertilization, organic fertilization, pseudogley, yield, triticale.*

ANALYSIS OF VEGETABLE PRODUCTION IN SERBIA

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Abstract

Vegetable production is one of the most intensive forms of agricultural production, although the areas of that production are getting smaller and smaller, regardless of our favourable ecological conditions. In Serbia, in 2006, vegetables were grown on 8% arable land. According to the latest data concerning the structure of planted arable land and gardens, vegetable accounts for 2.5%. Large regional deviations (differences) in achieved yield of the observed cultures can be noticed in Serbia. This paper tried to determine the place of Serbia when vegetable production is in question, in relation to the other neighbouring countries of the former Yugoslavia. In 2014, only Bosnia and Herzegovina had lower yield than Serbia. But, all the regional countries have something in common: lower average yield than EU. What encourages is the fact that the yield significantly increased in 2015 in relation to the previous year, making us approach the average production of our neighbouring countries. Having in mind that the vegetable fields are becoming smaller and smaller, production mainly stagnates. All 5 observed cultures are mostly imported in our country, but since the last five years, we haven't noticed any regularity, i.e. that one culture distinguishes more than the others, or that the import is only of seasonal character. The aim of this paper is to examine the conditions in vegetable production in Serbia, to compare them with those in our neighbouring countries which also went through the transition period in order to determine the problems of vegetable production in Serbia and how to reduce them.

Key words: *Vegetable production, Yield, Serbia.*

RESULTS OF INVESTIGATION WITH DIFFERENT VARIETIES OF SWEET POTATO IN SOMBOR AREA (SERBIA)

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Abstract

Sweet potato is becoming more popular culture for cultivation because of its nutritive values and pleasant taste. It is one of the most significant vegetable cultures in the world, while in our region people do not know much about it and it is not frequently cultivated vegetable. Sweet potato does not have much in common with potato except that they are used in the same way for the meal preparation. Latin name for sweet potato is *Ipomea batatas* and it belongs to the family of Convolvulaceae, while *Solanum tuberosum* potato belongs to the family of Solanaceae. Cultivation of sweet potato requires special climatic conditions and the right choice of soil. Agroecological conditions of our country are suitable for a successful cultivation of sweet potato, which is evident in the results of the trial conducted in PSS Sombor. On the trial field of PSS Sombor , the trial with two varieties of sweet potato was conducted during the period of three years. The trial is conducted in two variants with mulching with black foil and without mulching in ''drop by drop'' system. During the vegetation, no chemical treatments for protection from diseases and insects were applied. The trial results showed that with the application of modern growing technology, sweet potato can be successfully grown in Vojvodina.

Keywords: *sweet potato, vegetable, cultivation*

THE EFFECTS OF SOME SUMMER PRUNING AND HUMIC SUBSTANCE APPLICATIONS ON THE NUTRITIONAL VALUE OF ALPHONSE LAVALLÉE GRAPE CULTIVAR

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Abstract

Viticulture is an important agricultural branch in Turkey. Grape is the most grown fruit species in Turkey. The study was conducted Alphonse Lavallée grape variety (*Vitis vinifera* L.) grown on grafted 1103 Paulsen rootstock in Turkey in 2016. In the study, It was investigated effects of Control (C), 1/3 Cluster Tip Reduction (1/3 CTR), Shoot Tip Reduction (STR), Humic Substance Application (HS), 1/3 CTR+STR, 1/3 CTR+HS, STR+HS, 1/3 CTR+STR+HS applications on nutritive values. According to results; the maximum dry matter content 87.64 g/100 g with HS, 87.76 g/100 g with 1/3 CTR+HS, 87.78 with STR+HS and 87.67 with 1/3 CTR+STR+HS applications; the maximum crude protein 3.38 g/100 g with HS and 3.40 g/100 g with STR+HS applications; the maximum crude cellulose 4.46 g/100 g with HS application; the maximum total sugar content 64.64 g/100 g with STR and 64.64 g/100 g with HS applications were obtained. No statistically significant difference was found in terms of crude ash content.

Keywords: *Alphonse Lavallée grape cultivar, 1/3 cluster tip reduction, shoot tip reduction, TKI-humas application, nutritive values.*

ECONOMIC ANALYSIS OF FERTILIZATION IN THE RANGELANDS BY NUTRITIONAL VALUE: A NEW OPINION

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Abstract

Total production cost can increase, whereas total revenue and net benefit may reduce, due to an increase in custom fertilizer application cost in a degraded rangelands subjected to mineral fertilization. Therefore, to highlight the benefit response to applications of N, P and K on such a rangeland, the profit or loss was compared in three economic analyses. The data were obtained from an experiment organized during 2013-2015 to increase the productive potential of the rangeland, by fertilization composed of three nitrogen (0, 60 and 120 kg N ha^{-1}) and phosphorus (0, 60 and 120 kg P ha^{-1}) and two potassium (0 and 80 kg K ha^{-1}) rates. In all economical analysis were used total production cost (labour, mineral fertilizers, etc.), total revenue based on hay yield and price (HYP), the relative feed value (RFV) index as a tool for evaluating and marketing (RFVP) or conversion rate of consumable crude protein to meat on the hoof in cow-calf (CMP). The net benefit was higher in analysis based on CMP compared to other analysis. Moreover, the analyses based on HYP or RFVP had a lower profit or higher loss in the N up to 60 kg ha^{-1}. Therefore, NPK fertilization rates did not increase forage production enough to be profitable for animal production based on hay yield or RFV precise. These results indicate that this comparison was important to farmers because they are interested in seeing the criteria required to obtain a given increase in net benefits.

Keywords: *Rangeland improvement, range fertilization economics, relative feed value, crude protein yield*

EFFICIENCY OF DIFFERENT CHEMOMETRIC METHODS FOR DETERMINATION OF OIL CONTENT IN MAIZE BY NIR SPECTROSCOPY

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Abstract

In the process of developing calibration models, use of chemometric methods and data pretreatments help to improve the accuracy of estimation. The objective of this study was to compare five wavelength selection techniques and seven pretreatments for oil content estimation in NIR spectroscopy. Flour samples from 250 different maize genotypes were used as experimental material. Soxhlet extraction was performed to determine the oil content of the samples as a reference method. Derivatives (FD and SD), standard normal variate (SNV), and multiplicative scatter correction (MSC) were used as data pretreatment. To select informative wavelengths for improving the accuracy of the models developed, several techniques were used, such as MAXR, successive projections algorithm (SPA), uninformative wavelength elimination (UVE), competitive adaptive reweighed sampling (CARS) and random frog (RFROG) methodologies. Partial least squares (PLS) and multiple linear regressions (MLR) were used for model development. Full range of scanned interval (1200-2400 nm) and selected wavelengths by the chemometric techniques were designed as predictor variables in the models. Internal and external validations were performed to compare the robustness of the models developed. The best prediction performance (RMSEC=0.516, SEC=0.518, R^2_{Cal}=0.905, RMSEP=0.463, SEP=0.465, R^2_{Val}=0.823 and RPD=2.37) was obtained from the FD-MSC-CARS-PLS model combination. Our results showed that the prediction accuracy of the NIR calibration models for oil content could be improved by using novel techniques of chemometrics. Three different wavelength intervals (1200-1400 nm, 1600-1800 nm and 2000-2400 nm) within the scanned region turned up to be effective in estimating oil content of maize grain.

Keywords: *Regression, Zea mays, wavelength, flour*

THE EFFECTS OF DIFFERENT DWARFING APPLICATIONS ON BURSA BLACK FIG (*FICUS CARICA* L.) TREES IN TERMS OF YIELD AND QUALITY

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Abstract

The study to specify the effects of different applications for dwarfing, fruit quality and yield on Bursa Siyahı (Black Bursa) Fig Trees was performed between 2014-2015 in the parcel of Department of Horticulture, Faculty of Agriculture, Adnan Menderes University. In order to create artificial dwarfing on the fig nursery trees; Prohexadione-Calcium, a giberellin acid inhibitor, was used as 125 and 250 ppm. In addition, nursery trees were planted on 30° angle with ground level and were grown by strapping to galvanized wires. Two different dose applications of curving+Pro-cal were used and there have been 6 different applications in total including the control. The fig nursery trees were planted 1x1.5 m intrarow and above-row in parcels where branch bending applied and also 1x1 m intrarow and above-row in parcels where other applications made. Pro Ca applications were performed twice on vegetation period, by means of the period when new shoots are 5 cm tall on saplings. Morphological observations were performed to specify the effects of applications on dwarfing. Pomological observations were performed to specify the effects of applications on fruit quality and yield. Also, phenological effects of the application were observed. On Pro-Ca applications about the trunk development, node number increased while the trees with higher trunk length were obtained contrary to the expectations. On the applications where were not significant differences on the effects in fruit quality, the range of trunk cross-sectional area had the highest values in 125 ppm Pro-Ca application. Four old fig trees were observed phenologically and there were approximately a week delays in the development of trees with 30° sloping than standard trees.

Keywords: *Prohexadione Calcium, Pro-Ca, fig, dwarfing, fruit yield and quality, bending.*

DETERMINATION OF DEVELOPMENT STATES IN AYDIN REGION OF SOME APRICOT SPECIES

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Abstract

This study was conducted in 2012 and 2013 at the newly established fruit collection garden belonging to Adnan Menderes University Department of Horticulture, in order to determine the earliness and development performances of four domestic and foreign apricot species in the ecological conditions of Aydin. In the study, in addition to evaluating the phenological observations and morphological measurements of the species, it was tried to determine the necessity of chilling of Zaza species. There were differences in the phenological observations in both trial years. When morphological measurements were evaluated, it was seen that Iğdır (Aprikoz) and Roxana gave positive outcomes in both years. The chilling durations of the Zaza species were determined to be 697 cold unit value in 2012 and 685 cold unit value in 2013. Zaza was the earliest blossomed species, and Roxana was the species that needs chilling most, so it was the latest coming up species. This study will shed light on the coming years in terms of adaptation of the species tested in the light of the obtained data.

Key words: *Chilling, apricot, adaptation, phenology, morphology*

HAY YIELD AND SOME QUALITY TRAITS OF ALFALFA CULTIVARS IN THREE YEARS OLD STAND

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Abstract

This research was conducted to determine hay yield and some quality traits of alfalfa cultivars at the three years old stand. The experiment was established in 2013 autumn and the data were collected in the third year after planting (2016). As plant material Bilensoy, Kayseri, Verko, Gea, Plato, Victoria, Emiliano, Sunter, Nimet and Basbag cultivars of the alfalfa was used. The study was conducted as a randomized complete block design with 3 replicates. Plant height (PH), dry matter yield (DMY), protein yield (PY), ADF, NDF, phosphorus, potassium, calcium and magnesium content of alfalfa cultivars were determined in the study. All data was calculated as a mean or total of four cuttings. As a result of this study, among the cultivars, plant height ranged between 53.9 (Verko) and 72.8 cm (Sunter). The highest and lowest hay yield was obtained in Bilensoy (9.8 t ha^{-1}) and Victoria (1.5 t ha^{-1}). The CP content of cultivars varied from 22.2 to 23.8 %. The highest total protein yield was determined in Victoria and Sunter (3.3 and 3.2 t ha^{-1}), while the lowest Bilensoy (2.3 t ha^{-1}). ADF, NDF, phosphorus, potassium, calcium and magnesium ratio of cultivars varied from 27.8 to 31.0 %, 39.0 to 42.6 %, 0.36 to 0.39 %, 2.20 to 2.41 %, 1.45 to 1.54 % and 0.26 to 0.29 %, respectively. In the third year of the establishment, Victoria and Sunter cultivars kept high performance with regard to hay and protein yield, and the other traits.

Key words: *ADF, alfalfa, hay yield, protein yield*

EFFECTS OF VARIETIES AND HARVESTING DATES ON YIELD, YIELD COMPONENTS AND TECHNOLOGICAL CHARACTERISTICS OF SUGAR BEET IN KAHRAMANMARAŞ CONDITIONS

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Abstract

The purpose of this study was to investigate the effects of different varieties and harvesting dates on yield, yield components and technological characteristics of sugar beet in Kahramanmaraş, Turkey. The experiment was conducted according to split plot experimental design with three replications 2011 and 2012. Sugar beet varieties (Dozer, Dioneta, Cassandra, Leila, Agnessa) in main plots and harvesting dates (8 th September 2011, 27 th September 2011, 10 th October 2011, 1 st November 2011; 12 th September 2012, 1 st October 2012, 20 th October, 8 th November 2012) in the sub-plots were placed. The variety x harvesting date interactions was significant, the investigated characters were changed according to variety, harvesting date. The highest sugar yield (9660.10 kg ha^{-1}) were obtained from Agnessa, the highest root yield (60.05 ton ha^{-1}), α-amino N (0.062 mg 100 g $^{-1}$), ash ratio (3.335 %), clear juice purity (87.25 %), dry matter percentage (23.22 %) were obtained from Leila variety. According to harvesting date for the highest root yield (50.88 ton ha^{-1}), sugar yield (9570.15 kg ha^{-1}) were obtained from third harvesting date, α-amino N (0.06 mg 100 g^{-1}), dry matter content (% 23.13) were obtained from fourth, the highest sugar content (16.44 %) were obtained from second harvesting date.

Key words: *Sugar beet, variety, harvesting dates, root yield, sugar content.*

PERFORMANCE OF LOCAL OAT GENOTYPES AT DIFFERENT LOCATIONS

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Abstract

The aim of this study was to define grain yield and the quality traits of local oat cultivars grown in different region of Turkey. Fourteen oat genotypes were evaluated in a randomized block design with four replicates over the three locations for two consecutive years. Effects of genotype, location, year, genotype × location and genotype x year interaction on grain yield and quality traits were statistically found important. The oat genotypes showed variations for grain yield (2.39–4.65 t ha^{-1}), test weight (41.26–45.59 kg), groat percentage (70.02–74.44 %), protein (11.40–13.11 %), ash (2.41–2.90 %), starch (42.40-52.69 %), β-glucan (2.99-3.52 %), ADF (14.16–17.78 %), NDF (32.54–36.69 %), and fat (5.50–6.83). Linoleic, oleic, palmitic, stearic and linolenic acid contents of the genotypes varied between 35.20 to 38.98 %, 37.15 to 41.30 %, 17.54 to 19.26 %, 2.53 to 2.76 % and 1.23 to 1.46 %, respectively. According to the average of locations, the genotype G8 had the highest grain yield. Also, this genotype had high values for the desired quality traits.

Keywords: *Avena sativa, grain yield, quality, protein, oat.*

ECONOMIC ANALYSIS OF THE MULCH USAGE IN THE PRODUCTION OF WINTER LETTUCE

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Abstract

The economic analysis of winter lettuce production comprised three breeding technologies based on localized drip irrigation and using plants with protected root. These types differed in the applied mulch: a) uncovered area; b) mulching with black PVC film; c) covering with agro textile weight 17 g; d) a combination of black PVC foil mulch and agro textile. The research was done during winter (2009, 2010, and 2011) in a greenhouse with no extra heating. The greenhouse is located on the sample field in the area of the Agricultural Faculty in Eastern Sarajevo. The research comprised Santoro RZ variety. The results showed some variation, depending on the observed parameters, but the combination of mulch and agro textile was proved to be the best material. The most efficeint production is with usage of combination of black PVC film and agro textile. Production of lettuce with technology that includes a combination of black PVC film and agro textile is economically viable. This combination has achieved the rate of profitability of 58.22%

Key words: *winter production of lettuce, mulching, efficiency, effectiveness, protected space.*

CORRELATION AND PATH-COEFFICIENT INTERACTION BETWEEN YIELD PARAMETERS AND CROP MANAGEMENT OF PEAS

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Abstract

Path-coefficient analysis is very important statistical technique that can be used to quantify the interrelationship of different yield components. It was applied to study the interaction of applied agronomic activities on productivity of mid-early Bulgarian garden peas Pisum sativum cv. Promethei seeking to minimize pesticide use and to maintain sustainable quality and quantity of yield, and to prevent underground water pollution caused by using Dual 930EK/930g/l-s (metachloras) minimized herbicide doses from vegetative herbicide Basagran-200g/l (Bentazon) and Fusillade-200g/l (Fluasifop-P-Butil). Data was collected from long years trials on plants treated with different combinations of foliar suspension fertilizer Lactofol® with insecticides and herbicides. Results showed that grain yield (0.997), dry matter of the grain (0.996), Chlorophyll "a" (0.993), Zn (0.992), N (0.991), grain/whole pod ratio (0.984), total nitrogen (0.982), K (0.975), weight of 50 grains (0.973) fresh weight of 50 beans (0.962), fertile pollen (0.961), plant density/ m2 (0,873), the length of beans (0.871), sterile pollen (0.837) had positive impact on yield. Dry matter, grain yield, dry matter of grains, chla, N, weight of 50 pods, fertile pollen, and plant density/ m2 showed positive direct and indirect effects on yield. Other factors such as sugars (0.797), chlorophyll "b" (0.739), and starch (0.620) had an indirect effect on total yield. Grain yield should be given prior attention in field pea improvement programmers due to its major influence on yield. This research gave valuable information about which steps of agro techniques needs more attention to enhance best quality and quantity of sustainable yield.

Keywords: *Correlation, path-coefficient, garden peas, growth, yield.*

IMPACT OF SLAVOL MICROBIOLOGIAL FERTILIZER ON SOIL MICROORGANISMS DURING CAULIFLOWER (*BRASSICA OLERACEA* L.*VAR. BOTRYTIS*) GROWTH

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Abstract

The experiment was conducted in order to determine the influence of the microbiological fertilizer Slavol on the number of microorganisms in the soil where cauliflower was grown in open field. It was used the variety Barselona F1 which was grown in Skopje region during three years (2011, 2012, 2013). The treatments were as follows: Ø control - without use of microbiological fertilizer, V-1 - foliar treatment every 7 days with 0.1% solution of Slavol and V-2 - drip irrigation treatment every 2 days with 0,1% solution of Slavol. The total number of bacteria and the number of examined physiological groups of microorganisms in the rhizosphere (nitrogen fixing bacteria 10^{-4}, cellulolytic microorganisms 10^{-4}, yeasts 10^{-4}, nitrifying microorganisms 10^{-4} and molds 10^{-3}) were counted. According to the results during three years examination highest average number of total bacteria was determined in the variant V-1 and V-2 in comparison to control and the soil before planting. The number of nitrogen fixing bacteria was from 4863519 in V-1 to 4923807 in V-2. The number of cellulolytic microorganisms was from 3288588 in V-1 to 3312114 in V-2. The number of yeasts was lower than control (3813208) and was from 3681506 in V-1 to 2585089 in V-2. The number of nitrifying microorganisms was very high in V-1 (7502534) and V-2 (7323212) in comparison to control (1331717) and fallow land. The number of molds was higher in V-1 (422192) and V-2 (352608) in comparison to control (340149) but lower in comparison to fallow land (474851).

Keywords: *cauliflower, microbiological fertilizer, groups of microorganisms, rhizosphere*

YIELD AND YIELD STRUCTURE OF DOMESTIC WHEAT VARIETIES DEPENDING ON SOWING RATES

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Abstract

In order to determine the effect of different sowing rates on yield and yield components of domestic winter wheat varieties used for the production of seed, the necessary research were conducted on the experimental field of the Public Institution Agricultural Institute of Republic of Srpska, Banja Luka (in further text: Institute) in entity of Republic of Srpska, Bosnia and Herzegovina. The field trial has been conducted with the usual methodology inherent to the seed production in our agro-ecological conditions. The trial was designed in four replications and three seeding rates (500, 600 and 700 germinated seeds/m^2) for the wheat varieties Nova Bosanka and Jelena. Optimum utilization of the genetic potential of these varieties and production capacity of soil with adequate agricultural technology largely depends on the number of plants per m^2, as the main yield component. The optimum size of a vegetation area is the area that provides the highest yield per unit area (Molnar, 1995). The different seeding rates have had different effects on the yield of the tested varieties, especially the yield components. This can be explained by the fact that this plant species has a great ability to compensate relationship among yield components and the yield. The highest average values of the number of productive spikes were implemented at the largest sowing rates. Neither one sowing rate showed significantly higher average values for grain weight per spike, mass of 1000 seeds, number of grains per spike and hectolitre weight. The highest average yield over 8 t/ha^{-1} was achieved with sowing rate of 600 germinated seeds.

Keywords: *Yield, Variety, Sowing rates, Yield components.*

SOYA VARIETAL TRIALS IN THE WARMEST DECADE

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Abstract

The varietal trials in our country have been analized in the last decade which has been the warmest one in the history of meterological measurement. In that period, soya production has been carried under the the conditions of ecological stress in even eight years.The experience achived in field trials have had great importance for broad production. In order to mitigate risk of unfavorable year, future strategy should include growing more soya varieties (from different maturity groups) avoiding sandy soils.

Key words: *soya, variety, trial, ecological stress*

DEVELOPMENT AND PRODUCTIVITY OF RICE CULTIVARS INTRODUCED IN BULGARIA AND THE EFFECT OF FOLIAR FERTILIZING ON THEM

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Abstract

The interest towards introduced cultivars (Turkish and Italian) is explained by the search for more suitable ones with good adaptability and high yield to be grown under the agro-climatic conditions in Bulgaria. The new foliar treatment products offered on the market, such as Folur, Amalgerol and Litovit, also provoked our research interest. The survey was carried out in the period 2013 -2015, applying the two-factor field experiment following the split plot design. Two Turkish cultivars Osmanchik 97 and Gala, along with four Italian ones – Lince, Cameo, Puma and Brio were set as factor one (A). The preparations Folur (2 l/da), Amalgerol (1.2 l/da) and Litovit (0,300 kg/da) were set as factor 2 (B) in the experiment. The survey studied the following factors: the phenological development of the cultivars, the dynamics of the general tillering and the impact of the foliar fertilizers on the productive tillering, the dynamics of the tested cultivar height growth with the preparations' impact on it, the surface of the flag leaf and yield. It has been specified that the cultivars of Turkish origin Osmanchik 97 and Gala had a shorter vegetative period (116 to 124 days), while for the Italian cultivars it lasted from123 to 132 days. A great number of tiller formations were determined in the course of general tillering, on the one hand, (from 7.5 per plant for the Lince cultivar to 8.7 per plant for Osmanchik 97), while a considerable reduction of the tiller number was observed, on the other (from 10.7% for Cameo to 31.7% for Puma) (2013). The tillering conditions in 2014 and 2015 were slightly worse so the cultivars formed fewer tillers. The Turkish cultivars Osmanchik 97 and Gala grew 10 cm higher than the Italian ones, which was the reason for their flattening in 2013 and 2014. The highest yield was observed with the Cameo (954.5 kg/da) and Brio cultivars (949.1 kg/da), which surpassed the Osmanchik 97 standard by 8.6% and 8%, respectively. The Amalgerol treatment proved to have the strongest positive impact on productivity and increased the average yield of the tested cultivars by 7.5%. On the average, the impact of Litovit and Folur for the same period was insignificant – 2.5% and 1.3%, respectively.

Keywords: *Rice, Cultivars, Foliar fertilizers, Development and productivity.*

FORMATION OF PANICLE BASIC ELEMENTS WITH TURKISH AND ITALIAN RICE CULTIVARS GROWN IN BULGARIA

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Abstract

A two-factor field experiment was carried out in the Saedinenie region, Plovdiv municipality, Bulgaria in the period 2013 - 2015 following the split plot design with size of the reporting plot of 14 m^2. Two Turkish (Osmanchik 97 and Gala) and four Italian cultivars (Lince, Cameo, Puma and Brio) were studied in the survey, grown on the larger plots (Factor A). Three foliar fertilizers – Folur, Amalgerol and Litovit were set on the smaller plots (Factor B). The non-treated variant of each variety was used as control. The following basic panicle indices were studied: length (cm), number of full and empty ears and their ratio, panicle seed weight, harvest index. All panicle elements were best developed in the favourable 2013 year. The average panicle length was 14.33 cm compared with 13.46 to 13.79 cm in 2015 and 2014, respectively. The panicles of the Italian cultivars stood out with longer panicles for the three consecutive years. The Turkish cultivars formed the greatest number of full panicle seeds with highest mass respectively, only under most favourable conditions (2013). The Italian cultivars, with the exception of Brio, behaved in a more adaptive manner throughout years with greater stress for the plants, especially during the flowering period (2014 and 2015). They formed seed from 2.45 to 2.85 g in 2014 and from 2.58 to 2.73 g - in 2015. The application of foliar fertilizers to varying degrees supported the plants to overcome stress and increased the seed mass. Correlative dependences were established among the studied panicle parameters.

Keywords: *Rice, Cultivars, Panicle elements, Foliar fertilizers.*

EFFECT OF DODDER WEED (*CUSCUTA EPILINUM* L.) CONTROL ON STRAW, SEED AND FIBER YIELDS OF THREE VARIETIES OF FLAX "*LINUM USITATISSIMUM* L."

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Abstract

Field experiments were carried out at El-Gemmeiza Agricultural Research Station, Gharbia Governorate (Egypt), during the two successive winter seasons of 2012/13 and 2013/14. In order to study the effect of dodder weed (*Cuscuta epilinum* L.) control treatments (Control, Hand combing, Spraying with sinal, Spraying with select super, Spraying with a mixture of (sinal and select super) and benzoic acid) on yield and yield component for three flax varieties (Sakha 1, Giza 10 and Souzana). Souzana variety gave the tallest plants and recorded the highest values of plant height, technical stem length and fiber yield per faddan. Also, we recorded the thinnest stem diameter and gave the lowest values of straw yield per plant and per faddan, in both seasons. Sakha 1 gave the thicker stem diameter and recorded the highest values of straw yields per plant and per faddan, while we recorded the lowest values of plant height and technical stem length. Giza 10 came in the intermediate for all studied traits. On the other side, the select supper recorded the highest values of plant height, technical stem length and straw yields per plant and per faddan. Furthermore, the application of the mixture (sinal and select super) recorded the highest values of main stem diameter, number of apical branches per plant, number of capsules per plant, number of seeds per capsule, fertility percentage, oil percentage and seed index. Moreover, the hand combing treatment was ranked the first and recorded the highest values of seed yield and oil yield per faddan.

Keywords: *Flax, dodder, control, fiber, straw, Cuscuta epilinum.*

RESPONSE OF WASHINGTON NAVEL ORANGE TREES TO EXOGENOUS APPLICATION OF UREA, PUTRESCINE AND GA_3 UNDER NEWLY RECLAIMED AREA CONDITIONS I: VEGETATIVE GROWTH, YIELD AND NUTRITIONAL STATUS

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Abstract

This study was carried out during two successive seasons 2010-2011 and 2011 – 2012 on 20 years old of Washington Navel orange cultivar budded on Sour orange (*Citrus aurantium*, L.Osbeck) rootstocks grown in sandy soil under drip irrigation system planted at 5x5m as a part in a private orchard (El-Shrouk farm) it located at (72 km of Cairo-Alex. desert road), El-Giza Governorate, Egypt. The main objective of this study was to investigate the possibility of pre-bloom foliar application of urea and Putrescine and full-bloom exogenous application of GA_3 for improve, growth characters, nutritional status and increase total yield of Washington navel orange. In addition to determine the optimum time of urea, Putrescine and GA_3 applied as a foliar spray to improve marketable yield of Washington navel orange for competitiveness of citrus fruit products in local and international markets. Results showed an improvement in the growth characters, yield and nutritional status with all foliar application treatments. Overall foliar application with urea, Putrescine at 4th week of December and Gibberellic acid (GA_3) on the first week of April improved leaf nutritional status. The Gibberellic acid (GA_3) increased the total yield.

Key words: *Washington naval orange. Gibberellic acid (GA_3). Putrescine. Urea. Pre-bloom foliar application, full- bloom foliar application, growth characters, Nutritional status, N, P, K.*

RESPONSE OF WASHINGTON NAVEL ORANGE TREES TO EXOGENOUS APPLICATION OF UREA, PUTRESCINE AND GA_3 UNDER NEWLY RECLAIMED AREA CONDITIONS II: FRUIT QUALITY AND PHYSICAL - CHEMICAL CHARACTERS

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Abstract

This study was carried out during two successive seasons 2010-2011 and 2011 – 2012 on 20 years old Washington Navel orange cultivar budded on Sour orange (*Citrus aurantium*, L. Osbeck) rootstocks grown in sandy soil under drip irrigation system planted at 5x5m as a part in a private orchard located at El-Shrouk district (74 km of Cairo-Alex. desert road), El-Giza Governorate, Egypt. The main objective of this study was to investigate the possibility of pre-bloom foliar application of urea and Putrescine and full-bloom exogenous application of GA_3 for improvement on fruit physical properties of Washington naval orange. Results showed an improvement in the fruit quality and physical parameters included: Ascorbic acid, Total acidity percentage, Total soluble solids (T.S.S. %), Total soluble solids/acidity ratio, Fruit weight, Fruit size, Fruit length and diameter, fruit shape index with all foliar application treatments. Overall foliar application with urea and Putrescine on the first week of February and Gibberellic acid (GA_3) on the fourth week of May improved growth characters, fruit quality and physical parameters of Washington Navel orange.

Key words: *Washington naval orange. Gibberellic acid (GA_3).Putrescine.Urea.Pre-bloom foliar application, full- bloom foliar application, fruit quality, physical characters, yield.*

ROOT DISTRIBUTION OF SUGAR BEET AND WINTER CEREALS ON DIFFERENT SOILS

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Abstract

Root distribution plays an important role in estimating soil organic carbon in agroecosystems. The evaluation of root distribution is difficult due to laborious measurements and root variability. Soil texture affects root penetration and thus alters the morphology and distribution of roots. The soil profile wall method is suitable for evaluating the effects of soil and other variables on root length density (RLD). RLD of winter cereals (WC) and their preceding crop sugar beet (SB) was observed using the profile wall method up to 2 m depth at three sites in Lower Saxony (Germany). The sites differed in soil texture comprising sandy (sand 84%, silt 14%, clay 4%), silty (1%, 80%, 19%) and clayey (2%, 56%, 42%) sites. Generally, the WC had higher RLD than SB and simultaneously the differences in RLD were higher between the sites. The results indicated a high variability of RLD in the topsoil (SB: 0.394 - 0.973 cm cm^{-3}, WC: 2.172 - 5.553 cm cm^{-3}). For both, SB and WC, importance of soil texture increased in the subsoil (soil layers 60-90 cm and 90-120 cm). In the depth 60-90 cm, the highest RLD of all species was found at the silty site and in the depth 90-120 cm at the clayey site. RLD of SB and WC correlated at all sites ($p < 0.05$). The correlation coefficient at the sandy site was r=0.85, followed by the silty site with r=0.83 and clayey site with r=0.69. This might indicate that sandy soil texture influences the species similarly.

Keywords: *Beta vulgaris, Profile wall method, Root length density, Winter wheat.*

THE EFFECT OF FERTILIZATION ON LAVANDULA ANGUSTIFOLIA L. YIELD IN NORTH GREECE

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Abstract

Lavandula angustifolia L. is a small orthodontic shrub with a dense branch. Spruces are of square cross-section, which quickly become woody. The leaves are about 5 cm long and linear. The color of the flowers is purple. Flowering shoots of this species contain 1.5-3% of essential oil. In this study we investigated the effect of four different fertilization levels (F1: black, F2: organic, F3: conventional 20-10-10 and F4: $N\text{-}NO_3$ 46-0-0) on fresh and dry weight of the perennial *Lavandula angustifolia* L. during the establishment year and the 2^{nd} year after establishment at an experimental farm at Kozani, North Greece in 2015 and 2016. It is well documented that the crop reaches its potential yield on the third-fourth year of cultivation and continues producing biomass for six to seven more years. Upon harvest (September 2015) during the establishment year, the crop reached a maximum dry yield of 0.22 tons per hectare and almost the double yield 0.55 t ha^{-1} for the treatment of the organic fertilization which produced the higher yield. Therefore, the above data show that *Lavandula* cultivation could be a promising alternative crop, especially in case of the consideration that average selling price of dry drogue in Greece is 3.5-5 € kg^{-1}, while the selling price of its essential oil is 100 € kg^{-1}.

Keywords: *Lavandula angustifolia L, fertilization, fresh yield, dry yield.*

IN- VITRO SCREENING OF DURUM AND BREAD WHEAT GENOTYPES FOR DROUGHT RESISTANCE USING POLYETHYLENE GLYCOL

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Abstract

Durum and bread wheat are two of the most important crops for human nutrition. However, their productivity is limited by drought, which is nowadays the main abiotic stressing factor. In order to study the effect of drought stress eight durum wheat (Anna, Sifnos, Mavragani, Elpida, Mexicali, Papadakis, Thraki, and Athos) and seven bread wheat cultivars (Acheron, Orfeas, Apollonia, Acheloos, Doirani, Nestos and Strymonas) were evaluated at three levels of drought treatment in completely randomized design with four replications. Mature embryos of the aforementioned genotypes, were cultured in MS solid medium with two different concentrations of polyethylene glycol (5 and 10% PEG 8000), where as a same medium but without PEG was used as control. The response of the genotypes was measured as embryo germination and callus production. Cultivar Acheron, which carries the 1BL.1RS wheat rye translocation, was the only one not affected by the presence of PEG. The drought treatment reduced the proportion of embryo germination in all other cultivars. This reduction was smaller in bread wheat Acheloos and Apollonia and in durum wheat in cultivars Thraki and Anna, whereas in two durum wheat cultivars (Papadakis and Mexicali) no germination was recorded in the presence of PEG. Regarding the second trait studied, the callus production was not affected by the presence of PEG. It was concluded that there are considerable differences in drought resistance between the genotypes studied. The presence of the translocation in cultivar Acheron seems to help its resistance to drought, but further research in needed to confirm it.

Keywords: *drought resistance, embryo germination, callus production.*

THE IMPACT OF NPK FERTILIZER ON ESSENTIAL OIL YIELD OF HYSSOP (HYSSOPUSOFFICINALIS L.) CULTIVATED IN IRAN

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Abstract

Hyssopusofficinalis is an herbaceous perennial plant of the family Lamiaceae. In this study the effects of fertilizers NPK on biological yield and essential oil yield in *Hyssopus officinalis* in Iran was investigated. Use of the third level of fertilizers ($N_{150}P_{120}K_{150}$) has increased dry weight of flowering branches (303 kg/ha), essential oil percent (2.87%) and yield of essential oil percent (8.8 kg/ha) compared to the control and the other 2 levels of fertilizers considerably.

Keywords: *Hyssopus officinalis*, *chemical* fertilizers, yield, essential oil and Iran.

RESPONSE OF OILSEED RAPE PROMISING LINES TO DELAY PLANTINGS IN TERMINAL DROUGHT STRESS CONDITIONS

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Abstract

In order to evaluate of oilseed rape promising lines response to delay plantings in terminal drought stress conditions, an experiment was carried out in a factorial split-plot arrangement based on RCBD with three replications for two years (2012-2014) in Karaj regions (Iran). Treatments included (1): Planting date in two levels such as 16 October and 1 November, (2): irrigation, in two regimes (I_1: full irrigation as control and I_2: withholding irrigation after silique formation stage) as main plots and (3): twelve oilseed rape genotypes as sub plots such as BAL2, BAL1, BAL3, BAL6, BAL8, BAL9, BAL11, BAL15, L72, R15, L109 and Okapi. The results demonstrated that the interaction effects of planting date, irrigation and genotype on silique number in per plant, seed number in silique per plant, 1000-seed weight, seed yield, seed oil yield were significant at 1% level probability. The maximum seed yield under planting at the appropriate time (16 October), full irrigation and drought stress conditions (withholding irrigation from silique formation) was observed in Okapi and L109 (5062 $kg.ha^{-1}$ and 3426 $kg.ha^{-1}$, respectively) that it was due to higher silique number per plant, and high seed number in silique per plant and 1000-seed weight. Among genotypes, R15 line under delay planting (1 November) and both full irrigation and drought stress conditions (withholding irrigation from silique formation) showed the maximum seed yield (2818 $kg.ha^{-1}$ and 1986 $kg.ha^{-1}$, respectively) that it was due to higher silique number per plant, seed number in silique per plant and 1000-seed weight.

Keywords: *Delay Planting Dates, Oil Yield, Promising Lines of oilseed rape, Terminal Drought Stress, Seed Yield and its Components.*

STUDYING THE EFFECT OF BIOLOGICAL FERTILIZERS ON YIELD AND PERCENT OF ESSENTIAL OIL IN *HYSSOPUS OFFICINALIS* IN IRAN

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Abstract

Medicinal plant (Hyssopus officinalis) is a rough perennial plant belonging to Lamiaceae family. In this study the effects of biological fertilizers NPK on yield and percent of essential oil in *Hyssopus officinalis* in Iran was investigated. Using the biological fertilizer (Nitroxin) by increasing dry yield of flowering branches (303 kg/ha), percent of essential oil (2.87%), yield of essential oil (8.8 kg/ha) had considerable increase compared to the control and the other 2 levels of biological fertilizer.

Keywords: *Hyssopus officinalis, biological fertilizers, yield, essential oil*

EFFECT OF UREA, HUMAX AND *RHIZOBIUM JAPONICUM* ON THE YIELD OF SOYBEANS

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Abstract

This experiment included two soybean cultivars, namely i.e. Habbit and L_{17} (main factor), with six fertilizer treatments as a split-plot on the basis of a randomized complete block design with three replications in 2014. The treatments comprised the control, seed inoculated with *Rhizobium japonicum*, nitrogen base (urea) + top-dress urea at R_2 stage (when the flowers open in one of the two upper nodes of the main stem with a fully developed leaf), nitrogen base (urea) + seed inoculated with *Rhyzobium japonicum* + top-dress nitrogen at R_2 stage, seed treated with humax + top-dress humax at R_2 stage, and nitrogen base + seed treated with humax + top-dress humax at R_2 stage (sub factors). The fertilizer treatments significantly increased seed weight and seed yield. The results showed that the Habbit along with nitrogen base fertilizer + urea nitrogen in the R_2, resulted in the highest seed weight. The highest seed yields were recorded in nitrogen base + seed treated with humax + top-dress humax at R_2 stage. It can be concluded that the use of nitrogen base in soybean production is inevitable. Moreover, at the end of the flowering stage (R_2), the consumption of nitrogen can improve the potential for a higher yield.

Key words : *Oilseed crops, nutrition, fertilizer, humic acid, inoculation.*

RESPONSE OF MAIZE TO FOLIAR APPLICATION OF SELENIUM UNDER WATER DEFICIT CONDITIONS

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Abstract

Because of the role in the antioxidant defense system, Selenium is essential for maintaining health and hormone balance in humans and animals. Poor dietary Se intake is a worldwide nutrition problem and Se-enriched plants may be the best way of achieving Se supplementation. Accordingly, a split plot experiment was conducted based on complete randomized block design with three replicates, to evaluate the effect of foliar application of Se rates (0, 10, 15 and 20g Se/ha) on the maize growth, grain yield, Se accumulation and distribution in plant tissues under three water deficit levels (irrigation at 80, 70 and 60% of field capacity, respectively). Results showed that intensifying water deficit stress, significantly dropped grain yield, stem and leaf dry weights and biomass by 22, 25, 36 and 27%, individually. However, increasing foliar Se application rates, significantly augmented these traits by 13, 53, 57 and 35%, respectively. The highest Se content and accumulation in Se enriched plants (60.07% and 63.65% of the totals) was found in grains. We concluded that water deficit stress as well as Se application rates, can influence Se amount of maize plants, which can change Se contents by affecting both Se quantities and dry weights of the tissues at the same time.

Keywords: *agronomic fortification, foliar application, selenium content, selenium distribution, selenium recovery.*

EFFECT OF AUXINS ON ADVENTITIOUS ROOT INDUCTION IN MEDICINAL PLANT CHICORY (*CICHORIUM INTYBUS* L.)

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Abstract

Adventitious root cultures of medicinal plants are a source of secondary metabolites of pharmaceutical importance. Chicory (*Cichorium intybus* L.) is a medicinal plant from *Asteraceae*. This plant contains many important metabolites including chicoric asid, inulin, scoline, coumarin and flavonoids. In this research an efficient protocol has been developed for the root culture of leaf explants from 25 days old *in vitro* raised seedlings cultured on MS medium supplemented with different concentrations of Indole-3-acetic acid (IAA) and α-Napthalenacetic acid (NAA). Medium devoid of auxins was used as control. Among the different concentrations of IAA and NAA, 1.5 mg 1^{-1} NAA was proven as the best auxin source for adventitious root induction (100 percent) and maximum mean numbers of roots (8.04 per explant). Adventitious root induction was observed 7 days after culture. There were low roots formed from control explants. After four weeks well established roots were separated. To determine the best medium composition for growth of roots, approximately 100 mg fresh weight of adventitious roots obtained from leaf explants were cultured in MS liquid medium with different concentrations of IAA and NAA (0, 0.5, 1 and 1.5 mg 1^{-1}) under continuous agitation at 110 rpm in total dark condition. According to the results, the highest fresh (0.74 g) and dry weights (0.062 g) were obtained in MS liquid medium containing 0.5 mg 1^{-1} NAA in combination with 0.5 mg 1^{-1} IAA.

Keywords: *Adventitious roots, Cichorium intybus L., Indole-3-acetic acid, Naphthalene acetic acid, Secondary metabolites.*

APPLICATIONS OF INDUSTRIAL ENGINEERING IN HORTICULTURE AND BREEDING

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Abstract

Take the horticulture development in many areas, it evolves through a number of stages consist on agrarianism or the so-called farming reform was the starting point, in which producers were granted land ownership so that they could do planting in their own farm. Industrial engineering has been applied in many industrial fields but this paper explores its applications in horticulture and plant breeding. Horticulture relates to man's livelihood but usually suffers as a weak sector in economics and attentions to this filed are regained as food safety, therefore, this paper addresses an analogy between industrial engineering and horticulture production to demonstrate that industrial engineering can adapt to horticulture. In such system, low-input production, organic production and sustainable agriculture could be regarded in a new way. In particular, enterprise resource planning system can be implemented in farming, thus our short-term target is to transform traditional farms to modern ones to produce safe products. The enterprise resource planning system could be applied on plant breeding process to breed new genetically improved veracities effectively. The finaltargets are to provide safe products and to increase farmers' income as well as preparing new job opportunities which are expected to be created in modern farms.

Keywords: *Horticulture production, Enterprise resource planning system, Modern farms.*

PROTEOMIC AND MOLECULAR ANALYSES OF TOMATO PLANTS GROWN IN SOIL WITH BIOCHAR

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Abstract

The solution to environmental problems, climate change and the accumulation of greenhouse gases in the atmosphere could come from the past and be enclosed in a known material: charcoal or "biochar". Biochar is a rich-carbon charcoal obtained by pyrolysis of different biomasses, and it can be used for long-term storage of carbon in the soil thus reducing the amount of CO_2 in atmosphere, but also improving the chemical and physical characteristics of the soil. In fact, biochar reduces leaching of nutrients and water, increases the pH of the soil, favors the nitrogen-fixing and retains heavy metals and toxic substances. The starting material used for the production of our biochar was a mixture of beech, chestnut and acacia wood. We choose tomatos cultivations, San Marzano variety, because of their great economic relevance and the large diffusion in Mediterranean area, especially in south Italy.Also, we observed an increase of plant growth when a small amount of biochar was added to the soils compared to those grown in the soil without biochar. In literature, there is conflicting evidence about biochar effects on plant ability to respond to biotic stress. According to some authors the addition of biochar to soil positively stimulates defense, although other studies show that the addiction of biochar lower the defenses of plants. The data obtained through proteomic and molecular analysis of tomato plants show significant plant and soil benefits resulting from biochar, but also few negative effects like the variation of defense pathways.

Keywords: *proteome, tomato, biochar, climate change.*

THE IMPACT OF THE VEGETATION STAGES OF VEAT AND BARLEY GROWN IN SKOPJE AND BITOLA REGION (MACEDONIA) ON THE DYNAMICS OF THE RHIZOSPHERE MICROFLOLA

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Abstract

This paper is about the research made to determine the number of different groups of microorganisms in soil, rhizosphere and root area of wheat and barley in two different agricultural regions (Bitola and Skopje in Macedonia). Surveys were carried out over two year period, under laboratory and field conditions. The main objective of these studies was to determine the dynamics (number) of rhizosphere microflora in different stages of vegetation in wheat and barley. Soil samples were taken during the vegetation phases: four petals, blooming stage and physiological maturity stage of wheat and barley. This research confirms that the dynamics of the rhizosphere microflora increases when compared to the dynamics of the vegetation period, reaching their peak during the period of intense development and flowering of both cultures. Compared to the rhizosphere zone, the number of test organisms in the root zone is greater in both cultures. In the third phase of the wheat and the barley, compared to the second stage, the rhizosphere microflora is greater. This increase in numbers of microorganisms, is probably influenced by the root exudates of the cultures and applied agro-techniques.

Keywords: *Microorganisms, Soil, Rhizosphere, Wheat, Barley.*

EFFECT OF ORGANIC SUBSTRATES ON GINGER GROWTH, YIELD AND [6]-GINGEROL CONTENT CULTIVATED USING SOILLESS CULTURE SYSTEM

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Abstract

Ginger (*Zingiber officinale* Rosc.) belongs to a tropical and sub-tropical *Zingiberaceae* family, which originated from Southeast Asia. Ginger is one of the most widely used herbs contains several interesting bioactive constituents including [6]-gingerol that has potent antioxidant activity and health promoting properties. Ginger shifting cultivation practiced in Malaysia has caused land corrosion mainly in the highlands. Therefore, cultivating ginger using soilless culture system could be an alternative method to overcome this problem as well as the soil-borne diseases. Substrates play an important role for plants growth in the soilless culture system. Given the nature of the substrate may play a crucial role in determining water and nutrient availability for the plant and hence may affect the metabolic pathways involved in the synthesis of specific biochemical compounds, this study was conducted to determine the effects of organic soilless substrates such as coir dust and burnt paddy husks on ginger growth, yield and [6]-gingerol content using soilless culture system. The treatments were arranged in a randomized complete block design (RCBD) with five levels of treatment with three replicates. The treatments include, T1 = 100% coir dust; T2 = 100% burnt paddy husks; T3 = 70% coir dust and 30% burnt paddy husks; T4 = 30% coir dust and 70% burnt paddy husks; and T5 = 50% coir dust and 50% burnt paddy husks. Results showed that plant in T1 gave rise to highest rhizomes yield (5480 ± 325 gm) compare to other treatments. Media containing high amount of coir dust (70 – 100%) showed good growth and increased the rhizome yield up to 36% compared to those containing high amount of burnt paddy husks. There was no significant difference between all treatments in term of 6-gingerol content in the fresh and dry ginger rhizomes. The studies suggested that the secondary metabolites like 6-gingerol content and accumulation were not affected by the substrates. It can be concluded that 100% coir dust are the best substrates for growing ginger in soilless culture system.

Keywords: *ginger, substrates, [6]-gengerol, soilless culture system.*

EVALUATION OF EMS INDUCED GENETIC VARIABILITY IN RAPESEED (*BRASSICA NAPUS* L.)

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Abstract

Genetic variability is a prerequisite feature of any crop breeding program and chemical mutagenesis has become a proven way of creating new variations within a crop germplasm. Seeds of *Brassica napus* L. (variety 'INRA-CZH2') were treated by Ethyl Methyl Sulphonate (EMS), with 1, 1.2, 1.4 and 1.6% doses for 6, 7 and 14 hours, and were planted to obtain the M_1 plants and then the M_2 plants. The objective was to evaluate the novel induced variability observed for some important traits, such as days to flowering, days to maturity, plant height, number of branches/plant, number of pods/plant, number of seeds/pod, pod length, pod diameter and 1000-seed weight. Data were recorded on10 plants taken randomly from M_2 populations derived from each treatment (dose by duration), along with control plants (wild type). A large variability was observed and EMS treatment had a significant effect on all the traits studied. Compared to control plants, genotypes coming from seeds treated with low EMS doses were earlier to flowering and maturity. Also, seeds treatment by low EMS doses during short time allowed obtaining some plants with increased number of pods/plant compared to the control. Among the treatment levels used in the present research, 1% EMS for 6 hours was found to be the most effective in improving earliness and seed yield. This latter was mainly improved due to the increase of the number of pods/plant.

Keywords: *Rapeseed, induced variability, EMS treatment, earliness, seed yield.*

PERFORMANCE STUDY OF NEW INDUSTRIAL TOMATO CULTIVARS (LYCOPERSICUM ESCULENTUM) TO IMPROVE TOMATO PRODUCTIVITY IN THE GHARB REGION OF MOROCCO

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Abstract

Considering the importance of the performance of the variety in improving productivity, a comparative study of ten new industrial tomato cultivars was conducted at the experimental field of SidiAlla Tazi in the Gharb region north west of Morocco for their phenological and production parameters. The objective of this experiment is to study the agronomic performance of 10 Tomato cultivars in order to seek among them the most adapted and high yield potential in the Gharb agro-climatic conditions using qualitative and quantitative features. The cultivars trial was transplanted in April, with dual lines and led by fertigation. The tested plant material consisted ofcultivars with fixed growth. The adopted trial is a randomized block with four replications. Obtained results have statistically identified four cultivars; Num 0058 (120 t / ha), Artix (118 t / ha), Mariflor (117 t / ha) and Riotinto (116t / ha), which differ by the best morphological, agronomic and technological criteria as: height, vegetative port, Leaf Area Index (LAI), yield, synchronized maturity, precocity and Brix. These cultivars having expressed the highest yields and the best brix have shown the best performance of growth and development. The lowest yield was obtained by Heinz 2710 control (100 t / ha). In viewpoint of precocity, cultivars Num 0058 and NPT 63 are the earliest, while cultivars Riotinto and Artix are later.

Keywords: *Performance, Cultivars, Brix, Industrial Tomato, Morocco.*

MAGNETICALLY TREATED IRRIGATION WATER IMPROVES THE PRODUCTION AND THE FRUIT QUALITY OF STRAWBERRY PLANTS (FRAGARIA × ANANASSA DUCH.) IN THE NORTHWEST OF MOROCCO

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Abstract

Studies have shown that the magnetic field is used as a safe alternative choice to improve plant growth and development. Although the properties of magnetically treated water have received a great deal of interest in recent years, there are no studies conducted in Moroccan agricultural conditions. The present study aims at gaining more insight on the effect of magnetically treated irrigation water in the northwest region of Morocco, on the yield of strawberry plants (*Fragaria × ananassa Duch. cv. Camarosa*) and its components. The experiments were conducted at a site in the northwest of Morocco, during two crop seasons 2012 and 2014, with treatment (magnetically treated irrigation water) at two levels and 3 replications, and following a completely randomized design. Quantitative and qualitative traits such as: the number of flowers, the fruit yield, the number of fruits, the percentage of export production, and the fruit size were investigated for each treatment. The results confirm that physical treatment of irrigation water by a static magnetic field improve the yield and quality of strawberry fruits. The percentage of increase in number of flowers, number of fruits, fruit yield and quality of export production per 100 plants were 27,4%, 30,9%, 34,8%, 24,3%, respectively compared with normal irrigation water (average over both crop seasons). Magnetically treated irrigation water improves the production as well as the quality of the strawberry plant. The stimulatory impact was attributed to the increase of the availability of minerals in soil through boosting the solubility of salts and minerals. In fact, magnetic treatment of water restructures the water molecules into very small clusters. The size of molecule groups gets reduced below the diameter of capillaries in the roots of plants thus it can easily enter the passageways in plant cell membranes.

Keywords: *Magnetically treated rrigation water, Morocco, strawberry.*

EFFECT OF SOIL AMENDED HUMIC ACID AND PHOSPHORUS LEVELS ON WHEAT YIELD UNDER IRRIGATED CALCAREOUS SOIL OF PESHAWAR VALLEY

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Abstract

The sstudy on the effect of soil amended humic acid and phosphorus levels on wheat yield under irrigated calcareous soil of Peshawar Valley was carried out at Agronomy Research Farm, the University of Agriculture Peshawar during 2015-16. The design of the experiment was randomized complete block design with three replications. Humic acid (HA) (4, 8 and 12 kg ha^{-1}), phosphorus (60, 90 and 120 kg ha^{-1}) and two wheat varieties (Pakhtunkhwa-2015 and Pirsabak-2013) were used for experimental units. The seed rate for varieties was 120 kg ha^{-1} sown in six rows with 30cm row to row space in each plot. The plot size was 1.8 m x 4 m. Results of the study revealed that 12 kg ha^{-1} HA enhanced leaf area tiller (122 cm^2), leaf area index (3.6), grains $spike^{-1}$ (56.9), biological yield (9899.4 kg ha^{-1}), grain yield (3933 kg ha^{-1}) and harvest index (39.8 %) as compared with other levels of HA. Phosphorus at a rate of 120 kg ha^{-1} produced higher leaf area $tiller^{-1}$ (122 cm^2), leaf area index (3.6), grains $spike^{-1}$ (56), biological yield (9901.6 kg ha^{-1}), grain yield (3819.7 kg ha^{-1}), while harvest index (39 %) was maximum in 90 kg ha^{-1} P applied plots. Wheat variety Pakhtunkhwa-2015 performed better in leaf area tiller (126.2 cm^2), leaf area index (3.6), grains $spike^{-1}$ (56.1), biological yield (9938.1 kg ha^{-1}), grain yield (3766.4 kg ha^{-1}) as compared with Pirsabak-2013. Maximum harvest index (39 %) was recorded in Pirsabak-2013. It is concluded that variety Pakhtunkhwa-2015 with HA and P at rate of 12 and 90 kg ha^{-1} is the best for yield and yield components of wheat.

Keywords: *Humic acid, Phosphorus levels, Calcareous soil, wheat, yield.*

BACTERIAL AUXIN PRODUCTION: GROWTH AND YIELD ENHANCEMENT OF *TRITICUM AESTIVUM* L.UNDER DROUGHT STRESS

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Abstract

Water shortage is one of the major limiting factors that influence crop growth and productivity. Drought stress induces various physiological changes in plants which in turn cause reduction in growth and yield. Crop losses due to water shortage are very common in arid and semi-arid regions around the world. In present study, drought tolerant rhizobacteria of the genus *Bacillus, Enterobacter, Moraxella* and *Pseudomonas* colonizing the root system of *Acacia arabica* were isolated to mitigate the drought stress of wheat (*Triticum aestivum* L.). *In vitro* auxin production by rhizobacteria was quantified by Ultra High Performance Liquid Chromatography (UPLC). Analysis of the crude extracts detected the indole-3-acetic acid (IAA), indole-3-carboxylic acid (ICA) and indole-3-lactic acid (ILA). Highest IAA production of 25.9 $\mu g\ ml^{-1}$ was observed for *Bacillus amyloliquefaciens* S-134. Pot trials were conducted to evaluate the role of rhizobacteria to enhance the growth of wheat at different water regimes. At highest water stress i.e. 10% field capacity (FC), significant improvement of shoot length was observed with *B. amyloliquefaciens* S-134. For yield parameters, *B. muralis* D-5 and *E. aerogenes* S-10 recorded 34% and 1 fold increases for spike length and seed weight, over respective control at 10% FC. Mixed culture combinations of M-2 (*B. thuringiensis* S-26, D-2, *B. amyloliquefaciens* S-134, *B. simplex* D-11) and M-3 (*M. pluranimalium* S-29, *B. simplex* D-1, *B. muralis* D-5, *P. stutzeri* S-80) showed significant improvement for tillers and number of spikelets. In conclusion, application of the drought tolerant rhizobacteria can help to overcome productivity losses in drought prone areas.

Keywords: *Drought tolerant rhizobacteria, indole-3-acetic acid, ultra-performance liquid chromatography, plant-bacterial interactions, crop biofertilization.*

NS PEPPER VARIETIES IN A MULTIVARIATE FRUIT ANALYSIS

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Abstract

Peppers (*Capsicum annuum* L.) have a very diverse use in Balkan cuisines and Serbia is no exception. Different ways of consumption has come as a result of various types, colours and sizes of peppers. The aim of this study was the phenotypic evaluation of 16 pepper varieties. Ten pepper varieties were selected at the Institute of Field and Vegetable Crops in Novi Sad (IFVCNS), and 6 were domesticated pepper varieties from the IFVCNS assortment. The trial was conducted in field conditions on chernozem soil in 2016. The experiment was established in a randomized block design with three replications. Five fruits (from the second harvest) per replicate were used for a phenotypic evaluation. The varieties were characterized for 7 quantitative and 5 qualitative traits. The principal component analysis (PCA) was used to identify the most significant traits and to show distances between the varieties in a biplot. The cluster analysis was applied to show similarities between the varieties and to create common groups. In the PCA biplot all pepper varieties were grouped into five groups, but in the cluster analysis they made six groups. The biggest group in both analyses consisted of bell peppers. Variety *Una* had the longest fruit (15.18 cm), while *Novosađanka* had the shortest fruit (3.48 cm) with the biggest pericarp thickness (6.27 cm) . Those multivariate analyses are suitable to represent differences and similarities among pepper varieties visually.

Key words: *Capsicum, Serbia, Fruit evaluation, PCA, Cluster.*

THE EFFECT OF MULTI-YEAR CROP ROTATION ON THE WEEDINESS OF MAIZE

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Abstract

The paper deals with results of the effects of different crop rotation on the weediness of maize. The trial was carried out on the experimental estate of the Faculty of Agriculture - Zemun "Radmilovac" near Belgrade in Serbia. The trial was established from 1992 to present days. The following cropping patterns were included in investigations: continuous cropping, two-field crop rotation (winter wheat-maize) and three-field crop rotation (winter wheat-maize-soya bean) and six-field crop rotation (sunflower-winter wheat-maize-soya bean, spring barley+red clover, red clover). The goal of a crop rotation is to create an unstable environment that discourages weeds from becoming established in the field. The following effects of different crop rotation were studied: floristic composition in weed sinuzia of maize, number of individuals and biomass. Cropping pattern which included many various crops (two- field crop rotation, three-field crop rotation) has have better effect in weed control, especially perennial, than continuous cropping. On the basis of our investigations, it has been concluded that the cropping systems have had the important application in maize production and protective role in weed control. By rotating crops with different planting dates and growth periods, contrasting competitive characteristics and dissimilar management practices, the regeneration niche of different weed species could be disrupted and particular weed species prevented.

Keywords: *Crop rotation, Continuous cropping, Weeds, Maize*

EFFECTS OF TILLAGE SYSTEMS AND FERTILIZATION LEVEL ON THE WEEDINESS OF WINTER WHEAT

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Abstract

This paper deals with results of the effects of tillage systems and different nitrogen fertilizer level on floristic composition of weed communities in winter wheat in investigated period on the chernozem-luvic soil type. The trial was carried out on the estate experimental field of the Faculty of Agriculture - Zemun "Radmilovac" near Belgrade in Serbia. Tillage systems and fertilization with nitrogen fertilizers have a big influence on weed control and floristic composition, number of species and individuals and biomass of weeds and grain yield of winter wheat. The greatest number of species belonged to terrophytes in biological specter of weed communities. The obtained results showed that the dominant weed species were from perennials *Cirsium arvense* (L.) Scop., *Agropyrum repens* (L.) Beauv. and *Convolvulus arvensis* L. Conventional tillage had better effect in weed control than both of conservation tillage systems had. However, mulch tillage has not lagged behind the conventional tillage increased total weed number annual and perennial species especially biomass. This tillage makes weed control difficult.

Keywords: *Tillage systems, Nitrogen, Weed communities, Winter wheat.*

EFFECT OF VARIETIES AND AGRO-ECOLOGICAL CONDITIONS ON QUALITY PARAMETERS OF BREAD WHEAT

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Abstract

The aim of this study was to determine the significance of the influence of genotype and environmental factors on the value of gluten index and usability parameter as the indicator and predictor of bread quality. Five local varieties of winter wheat (Renesansa, NS-40, Janja, Pobeda, Cipovka) were grown in a macro experiment at the three localities (Novi Sad, Krusevac, Cacak) during two seasons (2014/2015 and 2015/2016). The analyses of variance revealed a statistically significant effect of genotype on gluten index value, while the influence of environmental factors, as well as the interaction of two factors had no statistical significance. The varieties with subunit 2+12 had significantly lower parameter value in relation to varieties with subunit 5+10. A weak negative dependence on gluten index and bread volume was determined. The gluten of the varieties used in our study can be, based on the value of gluten index, described as strong. The genotype proved to be the only cause of statistically significant gluten index variation. For the varieties used in our study prediction of the bread quality using gluten index value is unreliable because of the determined low degree of dependence of the parameter with a volume of bread.

Keywords: *Agro-ecological conditions, Variety, Wheat, Bread quality.*

EFFECTS OF CULTIVAR AND CULTIVATION TEHNOLOGY ON THE YIELD OF POTATO

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Abstract

Growing technology involves the use of complex cultural measures aimed at creating favourable conditions for plant growth and development, that is, for better exploitation of the genetic potential of cultivars. The effect of different soil thermal regimes induced by mulching with white and black polyethylene foil and organic mulch (straw) on productive characteristics of three potato cultivars Carrera (early), Laura (medium early) and Agria (medium late) in conditions of the drip irrigation system, was studied. Treatments were arranged in a randomized complete block design with four replications at the site of Zemun Polje (44°88'N, 20°35'E, 79 m a.s.l.) in Serbia in the period 2011–2013. The variants with different mulch materials were compared to a control plot with bare soil. The highest average tuber mass (146,3g) and total tuber yield (59,63t ha^{-1}) was determined in cv. Carrera subjected to the straw mulch treatment, while the highest average marketable tuber yield (49.9t ha^{-1}) was found in control variant. The lowest average total and marketable tuber yield was found in the cv. Lauraon the variant with white polyethylene foil (22.4t $ha^{-1}$and 34.70t ha^{-1}). The results obtained in our research indicate positive effect of the combination of irrigation and straw mulchon productivity of potato. For the purpose of obtaining a high potato yield, by regulating temperature of the surface layer of soil with the drip irrigation system, in combination with soil mulching with the use of resistant genotypes, it is possible to achieve adequate results in modern growing technology.

Key words: *mulching, potato, potato yield, tuber mass.*

SOIL AS A MEDIUM FOR GERMINATION TESTING OF SEEDS OF SOME INSECTICIDE-TREATED MAIZE INBRED LINES

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Abstract

The aim of this paper is to present soil as a growing medium used in germination tests of seeds of some insecticide-treated maize inbred lines that have been carried out at the seed testing laboratory of the Maize Research Institute, Zemun Polje in Belgrade (Serbia). Although soil is not recommended as a primary growing medium for seed germination because it is not included into standard methods, it is the most natural and the best growing medium for seed germination testing under laboratory conditions. Soil is recommended when seedlings show phytotoxic symptoms or when results of the standard germination test are uncertain. The standard method B(etween) P(aper) with 4x100 seeds and filter paper + soil method with 4x50 seeds was applied in the study in 2015 and 2016. Seeds were treated with the fungicide Maxim Xl and the insecticide Sonido. Soil used in the study was degraded chernozem taken from a maize field and prepared for the medium according to the standard procedure. Seeds were germinated in the germination room at the temperature of 20<=>30^{o}C and 16:8 of light:dark photoperiod. The first count and total germination were recorded on the 4th and the 7th day, respectively, in both methods. Obtained results indicate that total germination for all maize inbred lines was greater in both years of investigation when filter paper + soil method was applied.

Key words: *Seed germination, Maize inbreds, Soil.*

VEGETATIVE PROPAGATION OF ELITE TREES OF CORNUS MAS L. IN THE BELGRADE AREA BY SOFTWOOD CUTTINGS

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Abstract

The Cornelian cherry is ornamental, low maintenance, drought-resistant species, which has the high potential for sustainable organic production as valuable fruit species. It can grow on shallow soils and on the different soil types, from sandy to clay soils, having good potential as a species for erosion control. In this study, the effect of cutting type and auxine concentration on rooting of softwood cuttings of cornelian cherry was investigated. Different types of cuttings were taken from selected mother trees in the urban forest in Belgrade area. Cuttings were treated with auxine before sticking and rooted under intermittent mist. The obtained data were statistically analysed and the obtained results showed that cutting type, cutting size and auxine concentration influenced rooting rate. Best results (more than 90% rooted cuttings) were achieved with terminal cuttings treated with 1% IBA.

Keywords*: Cornus mas, IBA, green cuttings, auxine, vegetative propagation.*

THE SUM OF TEMPERATURE UNITS IN DIFFERENT PHENO-PHASES OF DEVELOPMENT OF SEED MAIZE REGARDING THE PRODUCTION YEAR

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Abstract

The aim of this study was to determine variability of temperature sums for the occurrence of pheno-phases of silking, tasselling and pollination of seed maize. Nine maize inbred lines were tested in two production years. Compatibility and overlapping of silking, tasselling and pollination of parental components in a seed crop are important for achieving high yields. According to obtained data, the degree of accumulation of temperature sums was higher in the first year than in the second production year for all stages except for the beginning of tasselling. The differences were statistically significant: the greatest and smallest differences were for tasselling (t2 - 70.9^{o}C) and the beginning of silking (s1- 20.86^{o}C), respectively. The effect of genotypes on differences in temperature sums was the greatest for all pheno-phases, $p<0.005$. The effect of the production year on the number of temperature units necessary for silking and pollination was also high, but there was no high statistical effect on the beginning of tasselling. Since maize is a plant species that is grown in different regions, maize growing practices should be adjusted to the main aim of maize production, to achieving high and stable yields.

Key words: *temperature sums, silking, tasselling, pollination.*

EARLY PHYTOTOXIC EFFECTS OF SULFONYLUREA HERBICIDES IN MAIZE LINES

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Abstract

Maize lines are susceptible to various stressful conditions. One of the main problems in maize seed production is weed control, since there are no herbicides registered for use in maize seed crop, while the herbicides commonly used in hybrid crop could express phytotoxicity to maize lines. The susceptibility of six maize lines to sulfonylurea herbicides (Motivell 6 OD – H1 and Equip – H2), applied in recommended dose – RD and double dose –DD was tested during 2015 and 2016. Herbicides were applied in 5-6 leaves phase (15-16 BBCH). Aboveground parts of maize plants were sampled for phytic phosphorus (P_{phy}) determination 48 hours after herbicide application. Grain yield was determined after harvest. Irrespective to the variations in grain yield between years, H1 treatment in average increased grain yield of L1, L3, L5 and L6 (mainly in RD) and decreased yield of L2 and L4, while H2 increased average grain yield of L3, L4 and L6 and decreased it of L1, L2 and L5, with slightly higher values obtained by DD, when compared to control. H1 treatment induced mainly decrease in P_{phy} concentration, while H2 induced increase in P_{phy} concentration in comparison with control, as a consequence of induced stress. This was underlined mainly by DD of applied herbicides. Variations in P_{phy} concentration in maize leaves showed significant and positive correlation with grain yield in L2, L3, L4 and L6, while the correlation was negative in L1 and L5. In those lines, H2 mainly induced yield reduction. The highest yield reduction by both herbicide treatments were obtained in L2, line with the highest P_{phy} increase induced also by herbicides, which defines it as a sensitive genotype. For its production, sulfonylurea herbicides are not recommendable for use.

Keywords: *Maize lines, Sulfonylurea herbicides, Phytic phosphorus, Grain Yield.*

GRAIN AND PROTEIN YIELD OF SELECTED GRAIN LEGUMES IN SUB-ALPINE AND PANNONIAN GROWING CONDITIONS

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Abstract

Present article discusses the productivity of selected grain legumes in integrated production systems in sub-alpine (Jablje) and pannonian (Rakičan) growing conditions in Slovenia. With the decline in legumes cultivation is Slovenia a net-importer of grain legumes. Almost all of soybean is imported and approximately 97% of imported soybean is GM. To support the introduction of soybean and reintroduction of selected grain legumes, a three-year state project was started in autumn 2014. Twenty-six different cultivars of soybean, four cultivars of peas, two faba-beans, blue, yellow and white lupine were tested in two different growing conditions in 2016. Morphological traits, yields, and content of protein and fat were evaluated. Results in Jablje show that the average grain yields of soybean, faba-beans, peas, white, blue and yellow lupines were 4761.2, 3723.7, 3675.3, 3658.4, 2188.2 and 643.9 kg/ha, respectively. Average protein yields per hectare were 1718.1, 974.6, 578.6, 1277.1, 632.3 and 252.4 kg/ha DM, respectively. At Rakičan, unfavorable conditions with late spring frost interrupted development of lupines. Therefore, only soybeans, faba-beans and peas could be evaluated. Nevertheless, drought conditions during summer also significantly affected soybean development, reducing yields and crude protein content. Average grain yields of soybean, peas and faba-beans were 3223.2, 4294.8 and 2291.5 kg/ha, respectively. Average protein yields per hectare were 895.3, 799.1 and 588.1 kg/ha DM, respectively. Results show that soybean had higher average yields of grain compared to other legumes at Jablje while yields of peas were competitive at Rakičan. Nevertheless, overall high crude protein content of soybean resulted in highest protein yield per hectare at both locations.

Keywords: *Soybean, pea, faba-bean, lupines, grain yields, protein yields.*

EFFECT OF SOME MICRO-CATCHMENT WATER HARVESTING TECHNIQUES ON SOME SOIL PHYSICAL PROPERTIES

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Abstract

The experimental work was conducted at Jebel Awlia locality 40 kilometers south of Omdurman city in Sudan during 2010-2011 and 2011-2012 rainy seasons to investigate the effect of micro-catchment water harvesting techniques on some soilphysical properties. Techniques used were, semi- circular, V-shaped, pits, deep ditches and land without water harvesting technique as control. Soil properties studied were infiltration rate, saturation percentage, bulk density and the percentages of clay, silt and sand. The results showed that infiltration rates in all treatments were lower than that of the control, the mean differences between treatments were not significant in the first season but significantly lower means were obtained by the semicircular and pits in the second season. Saturation percentage in both seasons were significantly lower after rainfall ascompared to that before rainfall for all treatments. Except for the semi-circular and the V-shaped treatments in both seasonsand deep ditches in the first season and pits in the second season, bulk density after rain fall was significantly lower than thatbefore rainfall. Clay content in both seasons was not significantly affected by the water harvesting techniques, except underdeep ditches in the second season and overall in both seasons. Silt content, in both seasons, was not significantly influenced bythe technique for all treatments, except during the first season, in which the techniques before rainfall had a significantly highermean as compared to that after rainfall. Effect of the water harvesting technique on sand content had insignificant effect,except the overall mean of the techniques during the second season, in which before rainfall was significantly higher ascompared to that of the control treatments.

Keywords: *Micro-Catchment Techniques, Infiltration Rate, Saturation Percentage, Bulk Density*.

DETERMINING CROP WATER STRESS INDEX (CWSI) OF PEPPER IN GREENHOUSE CONDITIONS

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Abstract

The crop water stress index (CWSI) is used the most common index to monitor soil, climate and plant. This research is to evaluate CWSI of pepper under different irrigation for greenhouse condition in Samsun Turkey. CWSI model for pepper was created by using plant energy balance and thermodynamic principles. Experiments were carried out during the summer of 2010, and Bafra Demre hybrid pepper cultivar was used as the plant material of experiments with drip irrigation. Four different irrigation treatments were created for the experiments (S_1 full irrigation, S_2 % 70 irrigation, S_3 % 30 irrigation, S_4 non-irrigation) and were tested in randomized block design with four replications. Plant cover ratio and air temperature differences (Tc-Ta) and vapor pressure deficit (VPD) were calculated to determine CWSI. Plant cover temperatures were measured with infrared thermometer. A threshold value of 0.15 was recommended for CWSI of pepper under greenhouse conditions with drip irrigation.

Keywords: *Pepper, Crop Water Stress Index, Water Deficit, Greenhouse.*

INFLUENCE OF TILLAGE PRACTICES ON THE OIL YIELD OF SOYBEANS

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Abstract

The soybean (Glycine max (L.) Merrill) is an annual legume that is primarily produced as a source of edible oil for human consumption. Generating higher yielding soybean cultivars is an important issue, as well as improving the value of seed ingredients, which is mainly consisted of protein and oil. Therefore, soybean production plays an important role. The objective of this study was to determine the influence of various tillage practices on the oil yield of soybeans (Glycine max L.). The tillage treatments were conventional tillage with residues incorporated in soil (CT1), conventional tillage with residues burned (CT2), reduced tillage with a heavy tandem disc-harrow (RT1), reduced tillage with a rotary tiller (RT2), reduced tillage with a heavy tandem disc harrow fallowed by no-tillage (RNT), and no tillage (NT). The tillage plots were of 12 m width and 40 m length (480 m^2). The applied treatments resulted in the soybean oil yield of 0.19; 0.21; 0.22; 0.22; 0.19 and 0.21, respectively.

Key words; *Soybean, tillage, oil yield.*

VALORISATION OF UNDER PRODUCTS OF SOME VARIETIES OF DURUM WHEAT'S CULTIVATED IN ALGERIA FOR THE FOOD OF THE RUMINANTS: 2 FINE SOUNDS

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Abstract

The food value of the fine sounds of the varieties of durum wheats cultivated in Algeria has as characteristics an average content of total nitrogen matters of 13,2 % of DM, a fat content rate of 2,4 % of DM and a content of mineral matter of 2,8 % of MS. These various chemical compounds their confer values in fodder units and digestible proteins less important than those of the fine durum wheat sounds Europeans.

Keywords: *fine sound of Algerian durum wheat, food value, food of the ruminants.*

GERMINATION CHARACTERS AND EARLY SEEDLING GROWTH OF WHEAT (*TRITICUM AESTIVUM* L.) VARIETIES UNDER SALT STRESS CONDITIONS

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Abstract

The aim of this study was to determine the most tolerant winter wheat varieties to the influence of salinity at germination stage and early seedlings growth. The salinity stress were simulated in controlled conditions by adding different concentrations of NaCl solution to the growing media of five winter wheat variety. In all studied varieties the benchmark water potential in which they had germinated and had a good seedlings growth was of -0.3MPa. Under the stronger stress, -0.6MPa, all varieties showed reduction in the all examined parameters. The variety Bosanka, had the highest final germination and germination energy under salt stres. The parameters defining the development or percentage of strong seeds, coleoptile and root length, fresh and dry weight of root and coleoptile of a seed were more affected by salt stress than germination and germination energy. Biplot analysis showed that wheat cultivars grown under -0.6MPa osmotic had higher values of root/coleoptile ratio in relation to control and -0.3MPa treatment which is the most reliable for screening properties of the genotypes for drought resistance in seedling stage.

Key words*: Winter wheat (Triticum aestivum L.), tolerance, NaCl, osmotic potential, biplot analysis*

THE EFFECT OF MINERAL TOP – DRRESING ON THE YIELD AND PROTEINS CONTENT IN SOME FODDER PEA VARIETIES

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Abstract

Forage pea is becoming more and more important plant species as the source of proteins in fodder foods. Although the surfaces on which this plant is grown have been increasing in Bosnia and Herzegovina still the farmers' needs have not been satisfied. A biannual experiment (period 2016- 2017) were set up on the Agricultural institute of Republic of Srpska with five sorts of spring pea (NS Dukat, NS Junior, Bakara, Saša and NS Javor) and different varieties of fertilization (control, NPK fertilization and NPK fertilization+nitrogen fertilization) so we could recommend the best variety to the farmers. Saša variety (29.72 t ha^{-1}) because of its yield stands out as the best one, but it also had high proteins content (19.99%), which is compared to the Baccara variety Baccara (20.04%) slightly lower. For economic reasons it is not viable to perform nitrogen fertilization together with NPK fertilization because it doesn't affect the yield increase, but it makes production more costly. Nitrogen fertilization negatively affects the proteins content so for these reasons basic fertilization with NPK fertilizators is recommended.

Keywords: *forage pea, variety, yield, proteins, green mass*

YIELD OF GREEN MASS AND HAY IN RESPECT OF PEA VARIETY, FOOD AND AGROECOLOGICAL CONDITIONS

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Abstract

Since the area on which the forage peas are cultivated has begun to increase, we set up trials at two sites, in Banja Luka and East Sarajevo, with five varieties of early forage peas. The trials included the domestic variety Saša, three varieties from Serbia (NS Dukat, NS Junior and NS Javor) and the French variety Baccara. The trials had three types of fertilization (without the use of mineral fertilizers, basic fertilization with NPK and basic fertilization with NPK + nitrogen supplementation). The largest number of preserved plants was in NS Dukat, the highest plants were in NS Junior, the highest yield of green mass in Saša, and the highest yield of hay in NS Junior and Saša. The application of the basic fertilizer influenced the tested parameters, while the application of basic fertilization in combination with the supplementation had somewhat poorer results. The agroecological conditions influenced the number of preserved plants and the yield of hay, so better results were achieved in the experiment field in Banja Luka.

Key words: *forage peas, yield, hay, green mass, plant height, plant number*

EFFECT OF NITROGEN FERTILIZATION IN TRITICALE (X TRITICOSECALE WITTM.), CULTIVATED AFTER DIFFERENT PREDECESSORS: NITROGEN UPTAKE AND EFFICIENCY.

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Abstract

The influence of the predecessors wintering peas, spring peas, sunflower, common wheat and triticale and different levels of nitrogen fertilization: 0 (N0), 40 (N40), 80 (N80), 120 (N120) kg/ha after legumes and 0 (N0), 60 (N60), 120 (N120), 180 (N180) kg/ha after the other predecessors on the nitrogen uptake, absorbed nitrogen by fertilization, nitrogen utilization and fertilizer use of triticale was established. Nitrogen absorption from fertilization increases with the increase of the nitrogen fertilizer rates. When growing triticale after legume predecessors the utilization of nitrogen is 35.39% and after sunflower, wheat and triticale - 26.76%. Specific expense for 100 kg yield of grain and straw in triticale was 1.9 kg nitrogen when growing after legume predecessors and 2.8 kg of nitrogen after other predecessors.

Keywords: *Nitrogen fertilization, triticale, predecessors.*

RESPONSE OF EARLY AND LATE MATURITY OILSEED RAPE CULTIVARS TO DROUGHT STRESS UNDER TWO CLIMATE CONDITIONS

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Abstract

In order to investigate response of three oilseed rape cultivars, grown under two climate conditions of Iran (cold and semi-arid and hot desert climates) to drought stress, two experiments were performed in 2011-2012. The experiment was conducted using a randomized complete-block design arranged in split-plot with three replicates. The irrigation treatments (I_1: full irrigation, I_2: withholding irrigation at flowering stage and I_3: silique formation stage until physiological maturity) were allocated to main plots, whereas subplots consist of oilseed rape cultivars including early maturating (GKH2005), relatively late maturing (Opera) and late maturing (Okapi) cultivars. The combined analysis results indicated that drought caused a significant reduction in seed number, 1000-seed weight, seed and oil yield, harvest index, relative water content (RWC) and leaf stomatal conductance. In addition, oilseed rape cultivars responded to irrigation treatments in different ways. For example, under full irrigation condition and withholding irrigation at silique formation stage, the maximum seed number per silique in the main stem was observed in Okapi cultivar, whereas GKH2005 cultivar produced the minimum seed number per silique in the main stem when irrigation was terminated at flowering stage. Results indicated that there was no significant difference between oilseed rape cultivars in terms of seed yield when grown under full irrigation condition; however, under drought stress conditions, the maximum and minimum seed yield were obtained from GKH2005 and Okapi cultivars, respectively. In general, the obtained results suggest that stomatal conductance, RWC and silique number per secondary branches are the most important traits determining drought tolerance.

Keywords: *Drought stress, Oilseed rape cultivars, Stomatal conductance, Seed yield, Water relations.*

THE IMPACT OF DIFFERENT TECHNOLOGIES ON THE PRODUCTION AND QUALITY OF TOBACCO SEEDLINGS

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Abstract

Tobacco has widespread areal of distribution and great adaptation towards outdoor conditions. During the production, the time of acceptance of seedlings, and the number of accepted plants per unit area are different and primarily depend on: biological potential of the varieties, technical measures and agro-environmental factors at the time of transplanting, but mostly from the quality of seedlings. The experiment was placed in the region of Veles for period of three years (2007/2008/2009), conducted in random block system, in four replications on two varieties of oriental tobacco (*Prilep NS 72, Yaka JV 125/3*) in three variants: variant 1-control; variant 2 Float Tray -N (TERRA STAR/22:11:22+2Mg) and variant 3 Float Tray -P (CHELAN/11:49:12+2Mg). The results show a statistically significant difference between numbers of accepted plants in the studied years. The results show that a high level of acceptance of tobacco after transplantation is greatly conditioned the result of seedling production technology. Therefore it is necessary, putting into practice appropriate, modern and profitable technologies for the production of tobacco seedlings, for successful and productive tobacco production.

Keywords: *Oriental tobacco, tobacco seedlings, quality, acceptance.*

INFLUENCE OF PERLITE AND USE OF ORGANIC FERTILIZERS IN GROWING HYDROPONIC TOMATOES

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Abstract

Tomatoes are the most consumed vegetables in the world, cultures can be made both on the ground and in different systems without soil. To obtain high yields, the vast majority of farms utilize for fertilization chemically produced fertilizers. In greenhouse experiments were used two tomato hybrids. For planting were used both grafted and not grafted tomatoe seedlings. Fertilizations were conducted with two organic fertilizers (Organic Grow and a new organic fertilizer) in three different doses. Control version was chemically fertilized. The experiment revealed that, although on the chemically fertilized variant production was higher, obtaining 12 kg/plant, on the organic fertilized versions production was between 9 kg/plant (using Organic Grow) and 10,7 kg/plant (using the new organic fertilizer). The organic fertilized variants had, also, higher early production. The data was statistically analyzed, and correlations between the type of fertilizer and production, plant mass and root system were conducted. Biochemical results performed on tomato fruits showed higher amounts of carbohydrates on organic fertilized variants. The purpose of the study was to evaluate the new organic fertilizer compared to other fertilizers used in experimentation, also to assess the quality of tomato fruits.

Keywords: *Perlite, organic fertilizers, hydroponic tomato.*

INFLUENCE OF 24EPIBRASSINOLIDE AND MANIPULATION OF ROOT STATUS ON PHOTOSYNTHESIS AND GROWTH OF A PLANTS OF AN MAIZE HYBRID

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Abstract

It is known that brasinosteroidni phytohormones can influence the redistribution of mass in the plant, ie. the so-called. source-sink relationships that represent main determinante of yield of crops. These processes has long been investigated, the various methods, for different levels of material of plants (the subcellular biochemical processes, the cell and culture of plant cells, tissues and organs of plants, whole plants, plant communities-phytocoenoses and agrophytocoenoses), but even today, many details of these processes are unexplained. We have considered here the problems in the corn plants (Z. mays L; hyb. ZP704), aged 1-2 months during the experiments, grown in vessels of different volumes (V = 5 or 11 l, S and L plants), wherein the part of the plant transplanted from vessels less than vessels having a larger volume (RP plants), thus, we manipulate the status of the root. At the beginning of the test plants were treated with 10^{-8} mol of 24-epibrasinolide (24-EBL) or with 10^{-6} mol propiconazole (PZR), an inhibitor of the biosynthesis of brassinosteroids. During the treatment, we have taken samples for morphometric analysis of plant growth, and we measured Chla fluorescence parameters as indicators of photosynthesis. We note that the manipulation of roots in plants grown in S wessel greatly restricts growth of maize plants stems, roots and leaves, where it is visible to this plant for 2 months fail to enter the generative phase of development, which does not apply to RP and L plant. 24-EBL phytohormones and PZR biosynthesis inhibitor of brassinosteroid synthesis generally act slightly stimulating effect on the growth of plants, wherein it is somewhat more pronounced effect of the PZR. Plants growing in small vessels also has lower values of photosynthesis parameters then in L and RP plants, but treatment of a 24-EBL works more on stimulating photosynthesis, then treatment of PZR.

Keywords: *Maize hybrid, 24epibrassinolide, manipulation.*

STABILITY ANALYSIS ON BREEDING STUDIES OF POTATO ADAPTABLE TO CENTRAL-NORTH INTERSECTIONAL REGION

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Abstract

This study was done as a part of the studies carried out on breeding potato varieties adaptable to central-north intersectional region. This study has been started in 2007, with about 20 thousand hybrid potato seedlings and as a result of clonal selection, 20 clones, performing excellent characteristics in terms of yield and quality characteristics, were subjected to the analysis of stability in terms of genotype x environment interactions. The study was conducted under Tokat-Niksar, Tokat-Kazova (2010-2011) and Tokat-Artova (beetween 2008-2009 and 2010-2011) conditions as a randomized complete block design with 3 replications in 8 different environments, as the year and location are accepted as an environment. In the study, four commercial varieties were tested as a standard beside White, cream, light yellow and dark yellow clones. The data were subjected regression analysis. Based on the Finlay-Wilkinson regression coefficients, some of the clones (A7-12, T5-4, T11-10, T5-14, A3-15, A3-167, and T10-8) which have better yield and quality characteristics than commercial varieties, showed good adaptation to one of the each environment as with the clones (T6-28 ve A3-234) adaptable to all the environments (Tokat-Niksar, Tokat-Kazova, and Tokat-Artova). Also in terms of dry matter, A13-1 has been identified as a clone with higher (28.4%) dry matter contents.

Key words: *Potato, clone Selection, Solanum tuberosum, breeding, Stability Analysis*

PRODUCTION POTATO PROMISING ADVANCED CLONES BY THE MERISTEM CULTURE AND DETERMINATION OF GENOTYPE REACTIONS

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Abstract

This study conducted Nigde Potato Research Institute - Turkey in 2015. In this study, it was aimed to produce mini-tubers of the seedlings of potato clone with meristem culture. Tissue culture studies began with pre-sprout. MS was used as the tissue culture medium and auxin (0,1 mg/liter Indole-3-Acetic Acid), cytokine (0,1 mg/liter Kinetin and 0,1 mg/liter GA3) were added to the medium. 2 mg/liter IBA was also used to root cutting in the nod culture medium. After the sterilization process, the leaf primordial of the shoots were removed under a binocular microscope and the meristem tips were placed in the MS medium by the sterile pens. Tubes containing meristems were taken in the climate chamber for 8 hours dark, 16 hours photoperiod, 1200-1300 lux light intensity illumination for 4 weeks. Plantlets 5-6 cm in length from the meristems were propagated by node culture. 2 mg/liter IBA, 6 g/liter agar and 20 g sucrose were used for the rooting medium. Thus, approximately 3 or 4 in vitro plants were obtained couple of months and then propagation was proceeded until enough plant numbers. In this study genotype effect was investigated. In this proceeding, the system's functioning and the different reactions of the genotypes will be explained in detail.

Key words: *Potato, meristem culture, in vitro plantlets, genotype effect.*

Acknowledgement

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GENETIC RESOURCE OF OATS (AVENA SATIVA L.) AND RYE (SECALE CEREALE L.) IN MONTENEGRO

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Abstract

Oats and rye are predominantly grown in mountainous region of Montenegro. Oat grains are of higher quality compared to maize, thus are mainly used in the diet of domestic animals, while rye, beside as feed, is also used in human nutrition, especially in the northern regions and mountain areas. Both species are considered secondary crops as significant part of their genesis occurred as weed in crops of wheat and barley. Neolithic migrants were unfamiliar with oats as crop. The Slavs were cultivating oats in their homeland, as evidenced by the unchanged name in all Slav ethnic groups. Once introduced, oats rapidly expanded into the northern and mountainous regions with natural conditions not suitable for other types of cereals. There is no precise data on when and where rye was introduced as crop, but it is certain that it was long after wheat and barley. According to some sources, it was about 1500 BC. Rye was initially grown in Turkey, from where it spread to other European countries. In order to avoid the adverse effect of low temperatures in the border of wheat crop cultivation, at the beginning rye was grown in mixtures with einkorn wheat and emmer, followed by cultivation of rye as independent culture.Except the inventory and collection activities, there have not been any other systematic studies of genetic resources of oats and rye in Montenegro. Collections of local oat and rye populations were carried out during 2009 and 2010. In a many collecting missions throughout Montenegro, 5 accessions of oats and rye each, were collected. Small number of collected accessions indicates that these activities began late after many local populations had permanently disappeared from the cultural flora. The basic characteristics of domestic populations of oats and rye are reflected in good adaptability to the agroecological conditions of the mountainous region, very high stem, low fertility, as well as considerable sensitivity to lodging and grain dispersal.

Keywords: *oats, rye, genetic resources, local populations, accessions.*

THE INFLUENCE OF DIFFERENT ORGANIC FERTILIZERS ON THE QUALITY OF IMMORTELLE (HELICHRYSUM ITALICUM (ROTH) G. DON) SEEDLINGS MATERIAL

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Abstract

The study of impact of different types of fertilizers on the quality of planting material of immortelle was carried out in greenhouse in 2017. The experiment was performed in 3 repetitions with 10 plastic pots each. The study included three organic fertilizers (Biofert, Shap liquid and Guano) with 5 variants of application and two controls: one variant that was not fertilized and other one fertilized with organic-mineral fertilizer Sapro elixir. The variants with the use of Guan (32.1 cm) and Biofert in the form of pellets (32 cm) had the highest influence on increase in average height of immortelle seedlings. Statistical analysis of data revealed a significant increase in the height of the stem compared with the control without the use of fertilizers and variants fertilized with organic liquid fertilizer Chap liquid. The highest above ground mass of seedlings was measured in variant fertilized with organic fertilizer Guano (17.5 g), followed by variants where Biofert granules (16.7 g) and Shap liquid (two time application) (16.1 g) were applied. Seedlings with the lowest aboveground biomass were measured in non-fertilized control (11.7 g). The differences in the above ground biomass of immortelle seedling between non-fertilised controls and all studied organic fertilizers, apart from the variant of one-time fertilized with Shap liquid, were also statistically justified. Plants with the highest root biomass were found on variants with the application of liquid organic fertilizer Shap liquid (one-time - 28.9 g and two-time application - 29.9 g) and Biofert granules (29 g). These fertilizers exhibited a significant increase in root biomass compared to all other variants of fertilization. The results obtained in this study show that the application of the studied organic fertilizers can produce very high quality immortelle seedlings.

Key words: *immortelle, seedling, organic fertilizer*

IMPACT OF SHEETING AND SHELF LIFE OF IBA 4000ppm ON PLANTING OF VEGETATIVE FRAGMENTS OF NATIVE AUTOCHTHONOUS OLIVE POPULATIONS

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Abstract

Autochthonous cultures are an asset in the conservation, evaluation and use of native genetic resources. Especially for olive culture, where some of the native cultivars are regionalized and occupy entire masses, in thousands of acres, in areas different species of Albania, others are at risk of extinction due to genetic erosion. Many autochthonous olive populations retain special values that remain potential for exploitation by scientific research. These in general represent interests in research, biological, genetic and productive, to highlight their values. But its use, among other things, is related to the accelerated growth of forms that are of interest to either direct sowing or in the function of genetic improvement. This requires, among other things, the solution of some problems related to the addition, especially the use of phytohormones related to the rooting of vegetative fragments, in particular the use of IBA. The use of plant hormones, which significantly increases the percentage of rooting and significantly shorten the time needed for the production of seedlings, provides healthy seedlings from phytosanitary etc.

Key words: *cultivars, indolebutyric acid, phytohormones ,treatment, position*

THE EFFECT OF ORGANIC AMENDMENTS ON UPTAKE OF HEAVY METALS IN MAIZE (*ZEA MAYS L.)*

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Abstract

The experiment was performed on an agricultural field contaminated by the Non-Ferrous-Metal Works near Plovdiv, Bulgaria. The field experimental was a randomized complete block design containing five treatments and four replications (20 plots). The treatments consisted of a control (no organic amendments), compost amendments (added at 2 t/ha and 4 t/ha), and vermicompost amendments (added at 2 t/ha and 4 t/ha). Upon reaching commercial ripeness, the maize plants were gathered. Heavy metal contents in roots, stems, leaves and grains of maize were analyzed by the method of the microwave mineralization. To determine the heavy metals in the samples, inductively coupled emission spectrometry (Jobin Yvon Emission - JY 38 S, France) was used. Tested organic amendments significantly influenced the uptake of Pb, Zn and Cd by the roots, stems, leaves and grains of maize. The compost and vermicompost treatments significantly reduced heavy metals concentration in grains but the effect differed among them. The 2 t/ha compost treatment led to decreased heavy metal contents in grains bellow the regulated limits.

Keywords: *Accumulation, Organic amendments, Heavy metals, Maize*

EXPRESSION PATTERN ANALYSIS OF ACC SYNTHESIS AND EREBP GENES IN RESPONSE TO DROUGHT STRESS IN CHICKPEA OF DIFFERENT GROWTH STAGES

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Abstract

Chickpea (Cicer arietinum L.) one of the most important grain-legume crop, is grown in more than 45 countries, mostly in arid and semiarid zones. Plants respond and adapt to water deficit at both the cellular and molecular levels. A large number of genes has been described that respond to drought at the transcriptional level and the mechanisms of the molecular response to water stress in higher plants has been analyzed by studying the expression of genes responding to drought and other abiotic stresses. The expression pattern of ACC synthesis and EREBP genes in two chickpea genotypes MCC283 and MCC80 in the *different growth stages* under drought stress were investigated. For drought treatment, soil-grown 30 day-old (*vegetative growth stage*), 60 day-old (*early pod visible*) plants were subjected to progressive drought by withholding water for 2, 4, and 6 days and untreated plants were used as control. RNA was extracted from leaf and then cDNA was synthesized. RT-qPCR analysis of ACC synthesis and EREBP expression using specific primers showed different expression patterns in different stages of both chickpea genotypes. Differential expression of ACC was observed in both genotypes in various phonological stages and its timing, duration and intensity of drought treatments. The expression levels of EREBP in both genotypes were increased significantly from 2 to 6 days of water deficit in vegetative and *early pod visible stages*. The increase in ACC synthesis and EREBP expression in the drought treatment for both genotypes in the *vegetative growth stage* and *early pod visible* might be an adaptation to overcome the stress condition, supplying energy for growth and survival, thus helping the plant to survive.

Keywords: *Chickpea; Drought stress; RT- PCR; Gene expression*

EVALUATION OF RELATIVE MEMBRANE PERMEABILITY OF SORGHUM UNDER POLYMER AND WATER DEFICIT CONDITIONS

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Abstract

Application of some materials such as Superabsorbent A200 polymer (SAP) in soil can increase soil water storage capacity and increase water use efficiency. The aim of the study was to estimate the relative membrane permeability of sorghum (*Sorghum bicolor* (L.) Moench) under irrigation regimes and superabsorbent polymer application to find the relationship between antioxidant enzymes, leaf rolling index and compatible solutes with relative membrane permeability. This experiment was conducted in Dashtak region of Zahedan (Iran) during 2014 and 2015 growing seasons. The experiment was arranged as a split-plot design with three replications with two factors including four irrigation regimes (40, 60, 80 and 100% crop evapotranspiration) as main plots and four amounts of superabsorbent polymer (0, 75, 150 and 225 kg ha^{-1}). Analysis of regression indicated ascorbate peroxidase, catalase, superoxide dismutase, glutathione peroxidase, proline, glycinebetaine, soluble sugars, leaf rolling index and relative membrane permeability showed that increasing amount of irrigation and superabsorbent polymer, decreased. The results showed that application of SAP reduced RMP by 4.98% under 100% ETc, but it increased RMP significantly by 14.14%, 12.18% and 11.48% under 80, 60 and 100% ETc, respectively.

Keywords: *antioxidant enzymes, compatible solutes, forage, leaf relative water content, leaf rolling index.*

ALTERATION IN LEAF GAS EXCHANGE AND PHOTOSYNTHESIS PIGMENTS OF PEPPERMINT UNDER COMBINED FERTILIZER AND DROUGHT STRESS PHOTOSYNTHESIS RESPONSES TO VARIOUS FERTILIZER TREATMENT IN PEPPERMINT GROWN UNDER DROUGHT STRESS

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Abstract

The severe decline of rainfall over the last decades along with overuse of chemical fertilizer is a major cause of soil fertility loss. The current study was conducted under open condition to examined the effect of vermicompost and urea fertilizer under drought stress condition on some photosynthetic parameters of peppermint. The experiment was designed as factorial based on completely randomized design with three replications in 2016. Different irrigation levels consisted of 75 (control, I_3), 60 (I_2) and 45% (I_1) of field capacity. Different proportions of vermicompost and urea consisted of control (F_1), 100% vermicompost (F_2), 75% vermi+25% urea (F_3), 50% vermi+50% urea (F_4), 50% vermi+75% urea (F_5) and 100% urea (F_6). Results for interaction indicated a significant reduction in photosynthetic pigments and gas exchange traits except Cartenoids and intercellular CO_2. The 40 and 55% irrigation significantly decreased the content of stomatal conductance. In contrast intercellular CO_2 increased when plant was under stress condition. The highest amount of chl a was in interaction I_3 and F_2 treatment. The peak of chl b considerably was in I_3 treatment interaction with F_6. Drought stress significantly reduced the ratio of a/b chl and the major a/b ratio was achieved in I_3 and F_3 treatment. It was found that the highest contain of cartenoids was obtained when drought stress was treated. Generally, the amount of photo and transpiration rate was higher in normal irrigation than in drought stress. The peak of these traits was observed in F_5 and F_6 treatment respectively.

Keywords: *Mentha Piperita, Photosynthetic rate*.

EFFECT OF MODERN METHODS OF TILLAGE ON YIELD AND COMPONENTS YIELD TRAITS OF WHEAT

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Abstract

Management of crop residues maintained with reduced tillage is the most cost-effective method of controlling soil organic matter losses and reducing farming damaged effects on water quality. This research was conducted with the aim to study effect of different managements of tillage on growth, yield and component yield of wheat. Four treatments (tillage methods) were: conventional tillage (CT); Raised bedminimum tillage + straw (MTS); no tillage + mulch (NTM). Traits such as plant height, peduncle length, spike length, spike weight, number seed in spike, seed weight in spike, number of till, seed 1000 weight, biomass, biologic yield, harvest index and seed yield were studied in the research. Data were analyzed using SAS software and traits mean comparison with Duncan test ($p<0.05$). Results showed that plant height and number of till in plant in different tillage treatments had a statistically significant difference. Biological yield with 13875kg per hectare in no-tillage was the highest, while minimum tillage + straw and Stubble cultivator obtained maximum harvest index.

Keywords: *Tillage, Physiological traits, Yield, Wheat.*

2. PLANT PROTECTION AND FOOD SAFETY

RT-PCR BASED PRELIMINARY RESULTS ON PBCVD, ADFVD AND ASSVD AT PEARS FROM ELBASAN AREA IN ALBANIA

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Abstract

Viroids are among important pathogens of fruit trees generally and pear cultivars in particular. In this study we report preliminary data on the presence of PBCVd, ADFVd and ASSVd at pears from one plantation located in Elbasan area, Albania. Plant material was collected in Spring 2017 from a pool of 200 trees, where leaf material was collected in five paralels from each tree in a scheme that envolved 1 in ten trees, altogether 100 samples. Total RNA was extracted and RT-PCRs were performed using three specific primer combinations (PB-PIII/PB-PIV for PBCVd, AS-37/ADAS-36 for ASSVd, and AD-38/ADAS-36 for ADFVd). The reaction mix and cycling conditions were prepared following the instructions of Superscript One–step RT-PCR with Platinum Taq Kit from Invitrogen and annealing temperatures were calculated accordingly to the primers. RT-PCR products were verified in 1.4% agarose gels. Results show the presence of PBCVd at 7 out of 10 trees; presence of ADFVd at 8 out of 10 trees; and ASSVd at 10 out of 10 trees, however, the amplicons of the last had smaller dimensions than the expected one. In conclusion, based on specific RT-PCRs there is presence of viroids at pear collection investigated, and further research is needed to calculate statistically the level of infection in the area.

Keywords: *Viroids, RT-PCR, specific primers.*

PHENOLIC PROFILE AND ANTIPROLIFERATIVE ACTIVITY OF CARDUNCELLUS HELENIOIDES (ASTERACEAE) EXTRACTS

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Abstract

This study aimed to quantify phenolic compounds in ethyl acetate and n-butanol extracts of *Carduncellus helenioides* (Asteraceae) leaves to compare the antiproliferative activity of their extracts to identify and quantify their phenolic acids. HPLC-TOF/MS analyses were carried out to identify and quantify some phenolic acids. In the n-butanolic extract a total of 12 compounds corresponding to phenolic acids and the flavonoid family were identified from *Carduncellus helenioides* in only 17 min. The phenolic profile showed the presence of nine phenolic acid derivatives (gallic acid, gentisic acid, chlorogenic acid, 4-hydroxybenzoic acid, caffeic acid, vanillic acid, cisic acid , ferulic acid and salicylic acid), and three flavonoids (rutin, quercetin and apigenin-7-O-glucoside). In ethyl acetate extract, the HPLC-TOF/MS analysis reveals the presence of 4-hydroxybenzoic acid, gentisic acid, chlorogenic acid, caffeic acid, vanillic acid, p-Coumaric acid, ferulic acid, salicylic acid, quercetin-3-β-D-glucoside, apigetrin. The ethyl acetate extract and the n-butanol extract had moderate anti-cancer activity compared to 5-FU.

Keywords: *Carduncellus helenioides, phenolic acids, HPLC-TOF/MS, antiproliferative activity*

EFFECT OF STURNUS VULGARIS DROPPINGS ON THE VEGETATIVE DEVELOPMENT OF LENTIL SEED (NORTH-ALGERIA)

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Abstract

The aim of this study is to verify the effect of the starling droppings on the growth of plants. Indeed, it was previously observed in the trial garden of Hamma (Algiers) that the droppings thrown by thousands of starlings perched on the trees to spend the night burned all the vegetation under these trees. For this, we planted lentil seeds in pots containing peat and starling droppings at different percentages. This experiment has been carried out in the botanical garden of the High National School of Agronomy at El Harrach, eastern part of the Mitidja. Thus 750 g of starling droppings have been collected under the olive trees. Physico-chemical analyzes have been carried out on part of these droppings.The second part has been crushed and then weighed in the laboratory. These droppings have been mixed with peat with different percentages. Thus, 4 lots have been placed under observation. The first lot has contained the pots with 0% droppings, the second lot with 25% of droppings, the third lot with 50% of droppings and the fourth lot with 75% of droppings. The lentil seeds have been placed there for germination. The results showed that the lentil seedlings of the second batch develop first and rapidly. Those of the first lot have developed less. No germination is observed in lots 3 and 4. In parallel, the analysis of starling droppings reveals an acid pH. The results showed that the 25% mixed droppings have a biofertilizing effect on the development of lentil plants. Beyond this concentration, these droppings were very acidic and caused wilting and death of plants.

Keywords*: European starling, Lentil seeds, Mitidja, starling droppings, Biofertilizing effect, Acidic PH*

POMEGRANATE JUICE AND NEUROPROTECTIVE EFFECTS ON LEAD INDUCED NEUROTOXICITY

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Abstract

The treatment of acute poisoning of aluminum is particular for the administration of metal chelators and in dialysis patients based on chelating drugs. This study is based on the effect of the pomegranate juice which is a medicinal plant, known for its antioxidant effects also demonstrating some efficacy on nerve cell damage. The objective of this study was to evaluate the in vivo protective effect of the pomegranate juice on chronic intoxication induced by aluminum chloride in Swiss mice with its concentration decreasing in brain. A total of twenty one Swiss female mice divided into 3 groups were used in the present investigation. Neurotoxicity was induced by administration of lead acetate dissolved in distilled water administered orally (1000 ppm) for the intoxicated groups (Pb), and intoxicated treated groups (Pb-J) pretreated with pomegranate juice (1:1) orally before administration of lead acetate during 12 weeks. After cessation of treatment neurobehavioral and histopathological studies were made to determine the effect of pomegranate at the cellular level. Lead exposed induced neurological discords and marked histopathological alterations in many areas of the cerebral cortex and hippocampus. Dietary supplementation with pomegranate juice significantly attenuated the level of anxiety; depression and correct locomotors hyperactivity in mice exposed to lead as well as restored the histological structure in cerebral cortex and hippocampus of mice. Metal chelating ability of high amount of polyphenols and flavonoids compounds found in pomegranate juice explains its neuroprotective effect. Data from this study suggest that pomegranate juice may positively affect health promotion via reducing the neurotoxicity risk by lead acetate.

Key words: *Pomegranate, Lead, Neurotoxicity, Neurobehavioral, Histopathology*

BIOACTIVE PROPERTIES OF FRUIT JUICE OF POMEGRANATE (*Punica granatum* L.) GROWN IN NORTHERN ALGERIA

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Abstract

Pomegranate fruits have attracted huge interest among scientists worldwide, thanks to both their chemical composition and sensory value. Diverse varieties, ranging from sweet to sour, may be used in the formulation of products with specific quality and organoleptic attributes. In relation to fresh fruit, products obtained from pomegranate fruits have very attractive sensory attributes, highly desirable for consumers. In the present study physicochemical characteristics, polyphenol compositions of pomegranate juice obtained from local pomegranate cultivar have been investigated. The cultivar 'Doux de Messaad' was obtained at harvest maturity in the south-west of Algiers, October 2014. Some physicochemical characteristics of the juice, including the total soluble solids, pH, acidity, maturity index and juice yield; were assessed. The fruit weight ranged from 264.90g while the arils and peels weighted from 154.10g - 109.43g, respectively. The results revealed that the studied pomegranate cultivar had high soluble solids content of the order of 27.50°Brix and a minimum titratable acidity (0.47%). The pH was 4.12 which were confirmed by the acid taste of the fruits. The total polyphenols, flavonoids and anthocyanin concentrations were 1600 mg GAE/L, 204 mg QE/L, 1586 mg CyE/L, respectively. This work demonstrates that indigenous cultivars can be a good source of different nutrients for the local population.

Keywords: *Pomegranate, Juice, Physicochemical characteristics, Polyphenol.*

ANALYSIS AND ANTIOXIDANT ACTIVITY OF THE ESSENTIAL OILS OF MENTHA ROTUNDIFOLIA

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Abstract

The Lamiaceae is a big plant family used in gastronomy for its characteristic smell that many species from this family have, mainly due to their essential oils. Many species are consumed in the eastern cuisine as food or condiment and are largely used in the traditional medicine owing to their curative and preventive properties. Many authors have reported antioxidant, antimicrobial, and anti-inflammatory properties of Lamiaceae species. It is well known that each species has a special, complex mixture of bioactive compounds in which each component contributes to its overall bioactivity. Furthermore, a direct food-related application has been established in some species. In the present work, the essential oils obtained by hydro-distillation of leaves and fruits of Mentha rotundifolia were analyzed by GC/MS. The main constituents of the essential oil from the leaves were germacrene (26.47%), caryophyllene (13.56%), β-farnesene (8.52%) and those from the fruits werepulegone oxide (83.51%), spathulenol (3.0%), caryophyllene (1.56%). The two essential oils were screened for their possible in vitro antioxidant activity with DPPH free radical-scavenging test. The findings showed a good percentage of reduction.

Keywords: *Antioxidant activity, essential oil, Mentha rotundifolia, Lamiaceae, food.*

EFFECTIVENESS OF WATER EXTRACTS OF *PEGANUM HARMALA* ANDESSENTIAL OILS OF *MENTHA PULEGIUM* ON *CALLIPTAMUS BARBARUS* (ORTHOPTERA: ACRIDIDAE)

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Abstract

This work is a study on the insecticidal effect of aqueous extracts of seeds and leaves of Harmal*Peganumharmala* and essential oils of mint *Menthapulegium* on both of two larvae L2 and L3 of barbarian locust *Calliptamusbarbarus* (Orthoptera: Acrididae). Treatments on *C. barbarus* have been performed by two ways: contact and ingestion. Contact allowed us to obtain a cumulative mortality rate (after 3 days of treatments) which was 90% for a highest dose (2.4 g/l) with an LD 50 of 0.67 g /l for *P. harmala*EAq seeds and 50% of mortality with 3.01g / l for leaves of the same plant. For the HEs of *M. pulegium,* with the highest dose (48 µl/ml) we recorded a cumulative mortality of 100%. The LD50 is 12.58 µl/ ml. By ingestion and after 6 days of treatments, the cumulative mortality rate for the dose of 2.4 g/l and the LD 50 of EAq seeds were respectively 90% and 0.45 g /l. For leaves of the same plant, these were 70% and 0.85 g /l. For the HEs of *M. pulegium*,the yield of mortality was 80% with a dose of 48µl/ml for an LD50 of 23.98 µl/ ml. Finally authors concluded that the results were very satisfactory.

Keywords: *Calliptamusbarbarus; Mentapulegium, Peganumharmala, Essential oil, Aqueous extracts, Mortality.*

COMPARATIVE STUDY OF ANTIBIOFILM ACTIVITY AND CHEMICAL COMPOSITION OF ALGERIAN PROPOLIS

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Abstract

The aim of this paper was to investigate the antibiofilm activity of five Algerianpropolis. Propolis extracts obtained by maceration in solvents of varying polarity were tested for their ability to inhibit biofilm formation and to reduce the formed film of eight bacterial strains including two standard and three methicillin resistant strains of *S. aureus*(M10-1, M18-3 and M20-1). In addition, *E. Faecalis* ATCC19433, *M. luteus* NRRL-B1013 and *Y.enterocolitica* RSKK1501 were also tested. Chemical investigation was performed usingultra-performance liquid chromatography with electrospray ionization coupled to tandem mass spectrometry (UPLC-ESI-MS/MS).All tested extracts exhibited the highest eradicating capability for *S. aureus*(especially MRSA18 and MRSA20). Twenty-six phenolic compounds were detected.Difference between the amounts of detected compounds was found to be significant. The main compounds were found to be caffeic and ferulic acids. The finding results suggest that those compounds might be responsible of the observed antibiofilm activity.

Keywords: *Algerian propolis, antibiofilm activity, methicillin resistant S. aureus, caffeicacid, ferulic acid.*

POPULATIONS OF APHIDS ON TWO MANDARIN VARIETIES AND THEIR CORRELATION WITH SOME LEAF CHARACTERISTICS

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Abstract

Mandarin is an important fruit crop in the world. It confronts many diseases and pests such as aphids. The use of resistant cultivars is an alternative control method that may limit the negative impact of pesticides. In the present study, the level of aphid populations on two mandarin varieties (Carvalhal and Ortanique) were investigated in an orchard situated in the region of Skikda (northeast Algeria), from January to June 2014, by sampling 16 leaves/variety monthly. Furthermore, the relation between the infestation degree and some leaf morphological and chemical characteristics are evaluated. We identified one aphid species on Carvalhal (*Aphis spiraecola*) and two species on Ortanique (*A. spiraecola* and *A. gossypii*).Concerning the fluctuations of aphid populations, ANOVA did not show a significant difference of infestation levels between the two varieties although we noticed that Ortanique was the most infested reaching its peak in April. In addition, during this month, Ortanique presented higher amount of total flavonoids and lower quantity of total phenols than Carvalhal. On the other hand, the comparison between the two examined cultivars revealed some differences in the leaf morphological characteristics such as its width and the intensity of its green color. These differences in leaf chemical and morphological traits of mandarin varieties might explain the variations in the infestation degree between them.

Keywords: *Aphids, Citrus, Ortanique, Carvalhal, phenols, flavonoids*

IN VITRO SCREENING OF INSECTICIDAL EFFECT OF PLANT AQUEOUS EXTRACTS ON THE COWPEA APHID *APHIS CRACCIVORA*

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Abstract

The research of new control methods that have low negative effects represent an alternative aiming to limit disadvantages of chemical control of pests. This study aimed to test the effect of 11 aqueous plant extracts belonging to four species (*Santolina africana, Juniperus thurifera, Artemisia herba-alba* and *Pituranthos scoparius*), on the larvae of the aphid *Aphis craccivora* installed on the leaves of *Robinia pseudoacacia* under laboratory conditions. The insecticidal effect of aqueous extracts on the mortality of aphids was evaluated by the introduction of acacia leaflet into an extract and infestation of them by 10 larvae of the aphid. Later, a counting of dead larvae after 3, 6, 12 and 24 h was performed. In addition, we investigated the effect of the aqueous extracts on the orientation of the aphids by putting the latter in a position of choice between six leaflets, each treated with a different extract. In addition, a phytochemical screening was carried out to detect the presence of saponins and polyphenols in the extracts studied. Through our study, the extract obtained from *S. africana* at a concentration of 15% was the most effective with a mortality rate higher than 80% after 24 h of artificial infestation. As for the effect of the four extracts on the orientation of the cowpea aphid, they did not attract the larvae massively. Regarding phytochemical screening, differences in the chemical composition of the analyzed extracts were observed. These differences may explain in part the variation of aphicidal effects of tested plant extracts.

Keywords: *Santolina africana, orientation, mortality rate, polyphenols, saponins.*

PRELIMINARY PHYTOCHEMICAL SCREENING AND ACUTE TOXICITY STUDY OF AQUEOUS EXTRACT OF AJUGA IVA (L.) SCHREB FROM ALGERIA

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Abstract

Ajuga iva (L.) Schreber is a perennial and aromatic plant widely used in Algerian pharmacopoeia for its different medicinal virtues, especially for diabetes, hypertension and hypercholesterolemia. This study was carried out to determine the phytochemical constituents and the acute oral toxicity of the aqueous extract of Ajuga iva. The active components were extracted from the aerial parts of Ajuga iva, by aqueous decoction followed by lyophilisation. Phytochemicals were screened by standard procedures. Acute toxicity study of the lyophilized aqueous extract of Ajuga iva was conducted in NMRI mice using oral single dose and according to the OECD guidelines – 420 (Acute Oral Toxicity: Fixed Dose Procedure). In the beginning, three single doses were tested 300, 2000 and 5000 mg/Kg b.w. and then two high doses of 8000 and 14000 mg/Kg b.w were tested to compare with a confirmed non toxic Morrocan Ajuga iva. The mice were observed for up to 14 days for any sign of toxicity or death after administration of the aqueous extract. Phytochemical screening revealed the presence of tannins, flavonoids, iridoïdes, mucilage, sterols and triterpenes, few essential oil, coumarins and saponins. In acute oral toxicity study, no alteration in the general behavior of animals and no mortality were observed in mice after oral administration of single dose of Ajuga iva aqueous extract even at the highest tested dose (14000 mg/Kg b.w) and found to be safe. Based on the results of the phytochemical screening and the acute oral toxicity, the present study suggest that Ajuga iva is safe to use at any dosage below 14000 mg/kg body weight, and it contains potentially healing compounds, which explains its traditional use to treat certain diseases.

Keywords: *Ajuga iva, Lamiaceae, medicinal plant, acute oral toxicity, phytochemical screening*

FAUNAL BIODIVERSITY ASSOCIATED TO THE TOMATO CULTURE (*LYCOPERSICON ESCULENTUM* MILL, TAVERA VARIETY) IN METIJDA

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Abstract

Tomato occupies a strategic place in the national and global economy. The objective of this study was to find out the entomofauneqtique procession associated to the culture of Tavera variety of tomato (*Lycopersicon esculentum* Mill). This study was conducted in a multispan greenhouse using the colorful pots traps sampling technique. A total of 45 colored pots are placed alternately: 9 traps at the ends of the culture and 5 between rows of tomatoes. The total number of species recorded shows the presence of 1736 individuals belonging to 146 insect species, distributed in 12 orders. The most abundant order was the Diptera with 44 species (34%) and with a predominance in red traps. In addition to Insects, 8% of the total number of individuals captured belongs to the Aranea, Acari and Collembola orders. Depending on the color of the traps, the overall rate of captured species was highest in yellow pots (41%), followed by reds (32%) and lastly the green pots (27%). The distribution of the different trophic categories revealed the existence of 5 large groups with the predominance of phytophagous species (34%). The values of (S) are between 48 species and 97 ($48 \leq S \leq 97$). The lowest total wealth was recorded in April with only 48 species, although the number of individuals captured was higher than in March (N = 537). The values of the Shannon-Weaver diversity index of species counted in colored traps, were from 4.20 to 4.89 bits. For the values of fairness, they varied according to the month from 0.47 to 0.81. The graph of factorial correspondence analysis highlights the presence of each season in a separate quadrant.

Keywords: *Lycopersicon esculentum Mill., Tavira, colorful pots traps, Diptera, parasites*

EFFECT OF GROWTH STAGE ON CHANGES IN ESSENTIAL OILS COMPOSITION AND ANTIOXIDANT ACTIVITY OF *ORIGANUM GLONDULOSUM* GROWN IN ALGERIA

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Abstract

Oregano (Labiateae family) has been widely used as a flavoring agent for meat and traditional medicines since ancient times. Due to pronounced antioxidant activity of its essential oils, is now cultivated in Algeria and plays an important role in the food and health care industry.The essential oils obtained by using the method of *Origanumglondulosum*, harvested at three different growth stages, were analyzed by GC-MS. Globally, 44 compounds were identified, with thymol (40.06-45.64%), cyclohexasiloxane, dodecamethyl- (5.56-10.29 %), carvacrole (1.03-6.49%) and p-Mentha-1,4-dien-7-ol (0.0-8.86%) as main constituents. Oxygenated monoterpenes were the most represented chemicals in the oils of the plant. The essential oil underwent a considerable variation in its composition during various developmental stages, particularly in the amounts of thymol that increased significantly passing from the vegetative to the flowering stage. Conversely, cyclohexasiloxane, dodecamethyl- showed the opposite trend. Furthermore, the essential oil yields were quite low during the flower budding phase (2.15), but they rapidly increased during plant development (3.89 and 4% for fruiting phases, respectively). The essential oil samples were screened for their possible *in vitro* antioxidant activity by using the DPPH free radical-scavenging test. The findings showed that the percentage of reduction is very important, especially in the fruiting stage.

Keywords*: Origanum glondulosum, essential oils, GC-MS, antioxidant activity, yield, food.*

WHY *APHIS SPIRAECOLA* (HEMIPTERA: APHIDIDAE) IS BECOMING THE MOST DOMINANT PEST ON CITRUS IN ALGERIA?

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Abstract

In the last few years the aphid *Aphis spiraecola* Patch (Hemiptera: Aphididae) has become the most abundant pest in Algeria. Its population dynamics is connected with favourable factors (young shoots of *Citrus* and suitable climatic factors) or unfavourable factors causing its death as unsuitable natural enemies or high temperatures. The objective of this work was to evaluate the potential of parasitoids associated with *A. spiraecola* for understanding why this aphid species was not efficiently controlled by natural enemies. This study was carried out during the spring leaf-flushing period in 2016 and 2017 in 02 orchards located in 02 sites situated in the Mostaganem region. Sampling of 100 infested young leaves weekly taken from 10 citrus trees in each site showed the predominance of *A.spiraecola* with high densities reaching at least 150 aphids per leaf (10 individuals per cm2).The total parasitism rate remained below 3%.We identified two primary parasitoid species *Lysiphlebus testaceipes* Cresson and *Binodoxys angelicae* Haliday (Hymenoptera: Braconidae) and 4 secondary parasitoid species (hyperparasitoids) with the first record in Algeria of an hyperparasitoid belonging to Charipinae (Hymenoptera: Fitigidae). The parasitism rate in the plantation conducted under a conventional management with sprays of insecticides was by far lower than parasitism rate obtained under ecological management. Protection of *Citrus* from *A.spiraecola* feeding is becoming very difficult because of several factors such as early presence of hyperparasitoids in orchard, relative failure of the development of *L.testaceipes* with a high number of aborted mummies and the possible presence of endosymbionts in aphids providing protection against parasitic wasps

Keywords: *Aphis Spiraecola, citrus, Algeria.*

LIQUID MICROFERTILIZERS ON THE BASE OF HUMIC SUBSTANCES OF PEAT

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Abstract

Agricultural production demands balanced nutrition of plants by microelements according to its biological needs, agro-chemical peculiarities of soils and a planned level of crops, as the use of bio–chemical active preparation, providing positive influence on the growth, development of plants and quality of production. The prescriptions to prepare concentrated liquid micro-fertilizers with zinc, copper, boron, manganese on the basis of peat humic preparation, allowing taking one litre of the composition (when diluted in 200 times) to make non-root treatment of 1 hectare of agricultural crops optimal for plants growth and evolution concentrations of microelements and bio-stimulant have been developed. A humic preparation (HP) was used as a plant growth stimulator, derived due to the proceeding of peat by ammonia with increased temperature and pressure, which allows increasing its complex and compound ability and physiological activity. Next compounds were developed: EleGum (HP–10 g / l, Cu–50 g / l), EleGumZinc1 (HP–10, Zn–50), EleGumZinc2 (HP–10, Zn–75), EleGumBoron1 (HP–10, B–50), EleGumBoron2 (HP–10, B–100), EleGumBoron3 (HP–10, B–150), EleGumCopperManganese (HP–10, Cu–25, Mn–25), EleGumBoronCopper (HP–10, B–50, Cu–50), EleGumBoronManganese (HP–10, B–50, Mn–50), ElegumBoronZinc (HP–10, B–50, Zn–50), ElegumZincManganese (HP–10, Zn–30, Mn–30), ElegumComplex (HP–0,5, Cu–2, Mn–2). Field tests with cereals crops, sugar beet and flax showed high efficiency of the fertilizers both for non-root plants feeding and for pre-sowing seeds treatment. The produce outcome was adjusted.

Keywords: *liquid micro-fertilizers, bio-stimulant, peat humic preparation, growth stimulator of plants.*

CONTROL OF STORAGE DISEASES BY PRE-HARVEST TREATMENTS USING BIOCONTROL ONAPPLEFRUITS STORED FOR LONG-TERM IN BELARUS

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Abstract

Apple production stays at the first place in the whole fruit production in Belarus. However, the production is significantly hampered by diseases caused by fungi, especially those affecting fruit during cold storage period. The effectiveness of biological control agent Ekosad (*Bacillus amyloliquefaciens*CFU 10^9) and fungicides: Bellis, Luna Tranquility and Merpan in protection against storage diseases of cultivars 'Darunak', 'Imant', 'Nadzejny' apples during storage has been investigated. The experiments were conducted in 2015–2017. The good results were obtained in the triple treatment with Ekosad, the losses of fruit from rots were 6.0 %, 4.7 % and 3.6 %, respectively, for cultivars 'Nadzejny', 'Darunak' and 'Imant' against 17.6 %, 10.5 % and 9.5 % in untreated variants (control). The best resultswere obtained with product Luna Tranquility. Apple fruits being attacked on a rate of 5.8 % - 'Nadzejny'; 4.3 % - 'Darunak'; 3.6 % - 'Imant'. Between tested fungicides, the worst results have been obtained in case of Merpan. The attack rate was 10.9 % in the case of 'Nadzejny'; 7.7 % for 'Darunak' and for 'Imant' 6.4 %. Bellis was more efficient than the fungicide Merpan, but less efficient than Luna Tranquility. Also, it was observed that in the case of 'Nadzejny' the main pathogen agent was *Monilia fructigena*, while for 'Imant' and 'Darunak' the most important was the bitter rot produced by the fungus *Neofabraea alba.* The pre-harvest treatments performed in the orchard had a major effect to reduce the percent of rotting fruits in the storehouse.

Keywords: *Treatments, Pre-harvest, Fruits rots, Storage, Belarus.*

TECHNOLOGICAL PROPERTIES OF POMEGRANATE JUICE FROM MOSTAR CITYAREA (BOSNIA AND HERZEGOVINA)

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Abstract

The aim of this work is a comparative analysis, microbiological and chemical characteristics of the pomegranate juice from area Mostar city, Bosnia and Herzegovina. Sampling of juice was randomly selected, selecting from area Mostar city: Podgorani, Vrapčići i Bijelo Polje. Microbiological analysis were: *Salmonella types* in 25 g (ml), *Coagul.pos.staphilococae* in 0.1 (ml), *Sulph.red. clostridiae* u 0.1 g (ml), *Proteus species* in 0.1 g (ml), *Escherichia coli* in 0.1 g (ml) and total number of bacteria in 1 g (ml). Chemical analyses were: determination of soluble dry matter (manual refractometer), determination of the total dry matter (gravimetric), determination of total sugars (method by Luff-Schorl), determination of Vitamin C, the presence of artificial paints by the chromatographic method of color induration. The samples tested according to the provisions of the Ordinance on conditions in terms of chemical, microbiological correctness, which must comply with foodstuffs in the market, Official Gazette R BiH 2/92, rulebook on refreshing non-alcoholic beverages and similar products (Official Gazette of BiH No. 85/08, 54/11), as well as the Ordinance on microbiological criteria for food (Official Gazette of BiH No. 11/13).The results obtained indicate that all three analyzed juice samples deviate from the prescribed values, the microbiological correctness in terms of the total number of bacteria1 g (ml), as well as the dry matter content, while the high values of vitamin "C" in each of the tested samples determined, indicates a significant nutritive value of pomegranate juice and its significance in our diet, especially from the aspect of human health

Keywords: *juice, pomegranate, microbiological and chemical analysis, quality*.

WHITE CHEESE AS A SOURCE OF PEPTIDES WITH ANTIOXIDANT ACTIVITY

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Abstract

Oxidative metabolism is essential for survival of cells. A side effect of this dependence is production of free radicals and other reactive oxygen species that cause oxidative changes. Free radicals and reactive oxygen species are involved in initiation or progress of several degenerative diseases, including cancer, atherosclerosis, Alzheimer's, Parkinson's and diabetes. Therefore, control of oxidative stress seems to be one of the crucial steps in slowing down the progress of these diseases or preventing their complications. Besides other well-known natural food compounds, such as vitamin C, polyphenols, flavonoids and carotenoids, peptides released from different sources of animal and plant origin have been recognized as antioxidants. The research conducted over the last 15 years has shown that different types of cheese are a potential source of peptides that exhibit antioxidant activity. Although some bioactive peptides originate from milk itself, antioxidative peptides in cheese are mainly formed during cheese production, especially during ripening, which is one of the most important stages of its production. Since the ripening process of various cheese types differ significantly, it can be assumed that their antioxidant activity is also substantially different. White-brined cheese is specific for the region of South-Eastern Europe. It is characterized by relatively intensive proteolysis and as such may be of interest as a product with favorable functional characteristics. Yet, its functionality is still insufficiently characterized. This paper presents an overview of current knowledge on antioxidant peptides of white-brined cheese.

Keywords: *white-brined cheese, antioxidant activity, proteolysis, antioxidative peptides.*

EFFECT OF *IN VITRO* DIGESTION ON ANTIOXIDANT PROPERTIES OF WATER-SOLUBLE AND INSOLUBLE FRACTIONS OF WHITE-BRINED CHEESE

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Abstract

From the nutritional point of view, cheese is a good source of essential substances, such as proteins, vitamins, minerals and short chain fatty acids. In addition, cheese and other fermented dairy products contain a great number of bioactive peptides, including those with antioxidant activity. The level of these peptides depends on type of proteolytic agents (proteases and peptidases originating from milk, rennet, starter- and non-starter bacteria, ripening conditions and the stage of ripening. These factors are also responsible for differences between different cheese types, so it is obvious that bioactivity of cheese peptides depends on the type of cheese. This study deals with the change in antioxidant properties (total antioxidant capacity, reducing power and Fe(II) helating properties) of different protein fractions (water-soluble and insoluble protein fractions) of white-brined cheese induced by *in vitro* digestion. The investigated fractions were isolated from five different cheeses, including traditional Zlatar cheese, cheeses prepared from overheated goat and cow milk and cheeses prepared from enzymatically pretreated and overheated and then lyophilized goat and cow milk. These fractions were subjected to *in vitro* gastrointestinal two-step static digestion system and lyophilized. A degree of digestion was followed by SDS-polyacril gel electrophoresis. Antioxidant properties of water-soluble and insoluble fractions were measured before and after digestion. According to the results of this investigation, water-soluble protein fractions of white-brined cheeses excert excellent, but quite different antioxidant properties before digestion. For example, total antioxidant capacity before digestion ranged from 35.81 mmol Trolox Eq/kg (Zlatar cheese) to 131.43 mmol Trolox Eq/kg (goat cheese from enzymatically pretreated and overheated milk). Digestion *in vitro* conditions significantly improved the antioxidant properties of both fractions, especially of the water-insoluble fractions.

Keywords: *white-brined cheese, protein fractions, antioxidant properties*

RESULTS OF TWO YEAR MONITORING OF SPOTTED WING DROSOPHILA (Drosophila suzukii, Matsumura, 1931) IN BOSNIA AND HERZEGOVINA

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Abstract

Spotted wing drosophila (Drosophila suzukii, Matsumura, 1931), originated in Asia. This pest was noticed for the first time in Japan in 1916. In Europe, it was detected in Italy in 2009. During 2010, it was found in France, Russia, Spain and Slovenia. In Bosnia and Herzegovina, it has been present since 2013, when it was found on cherry plantation for the first time in Herzegovina. A survey of the presence of spotted wing drosophila in Bosnia and Herzegovina was conducted in 2015 in several regions with predominant cultivation of strawberries, raspberries and blackberries, but also other fruit species preferably attacked by spotted wing drosophila. Two types of traps (plastic bottles 0.5 liters in volume with four perforations 5 mm in diameter containing vinegar, and plastic rectangular containers 1 liter in volume, containing, in addition to apple vinegar, a yellow sticky card size 6x9 cm) were used for determining the presence of spotted wing drosophila. The traps were placed in different crops (strawberry, sweet cherry, cherry, peach, nectarine, fig, currant, gooseberry, raspberry, strawberry, grapes) during fruit ripening. Traps were checked twice a week and replenished with vinegar where necessary. During 2015, the highest catch of spotted wing drosophila was recorded in Hercegovina, in cherry plantations on the sites Rodoč, Potpolje and Blizanci. Pest was found also in East Bosnia region (Bratunac, Srebrenica), Central Bosnia (Sarajevo, Bugojno, Uskoplje, Kiseljak), and in Zenica - Doboj Canton (Žepče, Zavidovići). Besides above mentioned sites, during 2016 spotted wing drosophila presence was recorded in West Bosnia region (Bihać, Sanski Most and Cazin). In this year, the largest pest number was re-recorded in Herzegovina, where the catch per trap was more than 200 individuals. During two years research, spotted wing drosophila was found on 10 host species in Bosnia and Herzegovina with highest abundance recorded on cherry.

Key words: *Monitoring, spotted wing drosophila, Bosnia and Herzegovina.*

DISEASE INTENSITY AND SUSCEPTIBILITY OF STRAWBERRY CULTIVARS TO COMMON LEAF SPOT (*MYCOSPHAERELLA FRAGARIAE*) IN BOSNIA AND HERZEGOVINA

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Abstract

Strawberry is one of the most popular berry crops in Bosnia and Herzegovina (BiH) with increasing production in recent years. Common leaf spot caused by *Mycosphaerella fragariae* (Tul.) Lindau is the most important and the most common foliar fungal disease of strawberry in BiH. Incidence and disease intensity were monitored in three years trial (1999, 2000 and 2001) at two locations Veljaci-Ljubuški (West Herzegovina County) and Donja Papratnica-Žepče (Zenica-Doboj County) on ten strawberry cultivars (Antea, Arosa, Camarosa, Clery, Galia, Madeleine, Marmolada, Naiad, Siba and Tethis). Number of plants per cultivar was 200 for each site. The aim of our research was to determine the susceptibility of those cultivars to common leaf spot under field conditions. The disease severity was assessed according to the Mc Kinney formula based on an analysis of 100 randomly selected leaves of each cultivar and our own scale of 0-5. Cultivars Madeleine, Marmolada and Clery showed a very high level of susceptibility to common leaf spot. The lowest infestation by common leaf spot was recorded on cultivar Galia, while other tested cultivars were moderately susceptible. Intensity of disease was least expressed in 2009, and symptoms were significantly milder at the location Donja Papratnica-Žepče compared to location Ljubuški.

Keywords: *Fragaria x ananassa*, *Mycosphaerella fragariae*, *diseases intensity*, *cultivars susceptibility*.

STUDY OF FOLIAR FERTILIZERS IMPACT ON THE BIOMETRIC INDICATORS OF TWO COMMON WHEAT VARIETIES

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Abstract

The purpose of the present research is to study the significance and impact of factors: *variety* and *treatment options*, and their interaction on the structural elements of *Enola* and *Illico* common wheat varieties. For this purpose, an experiment was conducted in the period 2014-2016 in the training experimental field of Trakia University, Faculty of Agriculture, Stara Zagora, Bulgaria. The experiment was performed by the method of fraction plots, with a crop plot size of 10 m^2. It included two varieties of common wheat: *Enola* and *Illico*. Results of a two-factor dispersion analysis proved that A factor - *variety* had a dominant impact on *ear grains weight* indicator in 2014. It was statistically proven at $p \leq 0.001$. The lowest and mathematically unproven was B factor - *treatment options* and the interaction of both factors. The individual effect of the studied factors is much more expressed at the formation of the structural indicator for the examined wheat varieties.

Keywords: *Common wheat, yield, foliar fertilizers, ANOVA, Bulgaria.*

APPLICATION OF BIOTECHNOLOGICAL TOOLS FOR CROP PROTECTION OF COFFEE (*Coffea arabica* L.) VARIETIES IN COSTA RICA

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Abstract

Coffee (*Coffe aarabica* L.) is one of the most important crops in the world and one of the main export products on several developing countries. This crop is susceptible to different diseases and pests, being the coffee berry borer (CBB) (*Hypothenemus hampei* Ferrari) and leaf rust **(***Hemileia vastatrix***)** two of the major threats for its production. Also, a climatic condition such as soil salinity limits coffee production sustainability and profitability. The control of CBB insect depends mostly on the application of synthetic insecticides, which is harmful to the environment. As a result, resistant varieties are one of the strategies to control this pest. However, genetic resistance to CBB is one of the features that is not available in the coffee genetic pool of neither *C. Arabica* nor *C. canephora*. A suitable transformation vector with fruit tissue-specific promoter (CaEXP and CrLTP) for the expression of the entomopathogenic *cry10Aa* and *cy1Aa* genes from *Bacillus thuringiensis* was developed. The generation of coffee varieties resistant to CBB using transgenic technology and toleranceto leaf rust, by chemical mutagenesis using sodium azide and ethylmethanesulphonate (EMS) in embryogenic cell, are very important and constitute strategic tools in order to offer coffee farmers alternatives to control these important pests. On the other hand, the chemical induction of mutations for salt tolerance was determined by AFLP (Amplified Fragment Length Polymorphism) analysis. Coffee breeding programs could use mutagenesis combined with screening methods and molecular markers as an additional tool to induce novel traits and produce new and improved coffee cultivars.

Keywords: *Coffea arabica* L., *coffee berry borer (CBB), leaf rust, genetic transformation, chemical mutagenesis.*

MAJOR EPIDEMIC DISEASES OF CUCUMBER UNDER PROTECTIVE PLASTIC HOUSE IN SOME GOVERNORATES IN EGYPT

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Abstract

During winter 2017growing season of cucumber plants under protective plastic houses at some Governorates in Egypt some epidemic diseases *i.e.*, wilt and root rot , blight of young fruits , leaf spot and downy mildew caused high losses of growing cucumber plants and fruit yield between 100 and 60% under fungicides programmes management diseases were sharply increased during growing season of cucumber plants. Isolation trails of diseased samples recorded high frequencey of *Fusarium. solani* and *Fusarium oxysporum* from roots of wilted and root rot of diseased cucumber plants at Kafr El Sheickh (84%) followed by El Giza (60%) Governorates respectively. *Botrytis cinerea* was the common fungi caused fruit blight and leaf spots with high frequency (100%) of diseased samples at El Beheira followed by El Gharbeia (80-66.5%). Downy mildew caused by *Pseudopernospora cubensis* was recoded as epidemic disease at El Gharbeia Governorate than in other Governorates in this study. On the other hand, the minor diseases occurrence were powdery mildew caused by *Sphaerotheca fuliginea* was recorded at El Giza followed Kafr El Sheickh Governorates .In addation, stem white rot caused by *Sclerotinia sclerotorium* only was frequancey (100%) at El Beheira and (75%) at El Gharbeia Governorates. So, in the future, obligation of alternative fungicides *i.e.*, biocontrol agents, chemicals non fungicides *i.e.*, antioxidants, essential oils, and nanoparticles as eco-friendly agents of environmental resources will be consideration in integrated programme for controlling these diseases for improving yield quantity and quality.

Keywords: *Cucumber, Root Rot, Downy Mildew, Leaf Spots, Fruit rot.*

KEEPING THE QUALITY AND EXTANDING SHELF-LIFE OF STRAWBERRY FRUITS BY USING ARBIC GUM AS EDIBLE COATING

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Abstract

The aim of this study is keeping the quality and expanding shelf-life of strawberries fruits by using Arabic gum as edible coating. We used Arabic gum in aqueous solutions of 5, 10, 15 and 20% was applied as a novel edible coating to gardener-mature strawberries which were stored at 20◦C and 80–90% relative humidity (RH) for 10 days. Fruits coatings significantly reduced decay compared to control fruits. A significantly higher weight loss in 5 and 20% Arabic gum coatings was observed compared to 10 and 15% Arabic gum coatings. The maximum firmness was maintained by the 20% Arabic gum treated strawberry fruits until 6 day. The highest decrease in lightness (L*) was observed in uncoated strawberries followed by 5% coated fruits. The lowest soluble solids (SS) at the end of the storage period was recorded in fruit coated with 20% Arabic gum. The titratable acidity (TA) values of uncoated and coated fruits during storage decreased with storage time. The highest levels of ascorbic acid were observed in control fruits, closely followed by fruits coated with 5% Arabic gum.

Keywords: *Strawberries, Shelf-life, Arabic gum, Edible coating.*

A REVIEW ON ANTIOXIDANT, ANTICANCER, ANTI-INFLAMMATORY, ANTIMICROBIAL AND PHARMACOLOGICAL ACTIVITIES OF THE DOUM PALM (*HYPHAENE THEBAICA* L.) AND ITS BIOACTIVE COMPONENTS

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Abstract

The doum palm (*Hyphaene thebaia*) is a desert palm tree with an edible oval nut, originally native to the Nile valley. The trunk of this small palm commonly divides into two Y-fom trunks and often each branch divides again in a Y form, giving the tree a very distinctive appearance; it is dichotomous and arbor scent in nature. It is listed as one of the useful plants in the world. Doum nuts have high quality protein, high proportion of lysine and cysteine of crude protein, crude fat, crude fiber and mayonnaise as most important carbohydrate component. Phytochemical compounds of doum nuts such as tannins, saponin, steroids, glycosides, flavonoid, terpenes and terpinoids were found in low and moderate concentrations. The aqueous extracts of the doum nuts showed an antioxidant activity; this is due to the substantial amount of their water-soluble phenolic contents, as well as due to antimicrobial activity. Studies on antioxidant, anticancer, anti-inflammatory, antimicrobial and and pharmacological potential of *Hyphaene thebaia* extracts and its major phytoconstituents like essential oil, phenolic and flavonoid compounds are extensively discussed in this review.

Key words: *Doum, antioxidant, antimicrobial, anticancer, phenolic compounds*.

IMPROVEMENT OF SOIL PROPERTIES, GROWTH AND PROTECTION AGAINST *FUSARIUM*-WILT OF CUCUMBER BY *PIRIFORMOSPORA INDICA* AND TWO ORGANIC WASTES

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Abstract

The current work was started to identify non-chemical seed and soil treatments that are effective against *Fusarium*-wilt (FW) of cucumber, caused by the formae speciales, i.e *cucumerinum* of the soil-inhabiting fungus *F. oxysporum* Schlecht. Fr. (Fo) under reclaimed soils. The potential of Piriformospora indica (Pi), a plant-root-colonizing fungus as a seed and soil treatment to protect cucumber plants against FW was tested in greenhouse trials. Moreover, the role of some organic wastes as soil amendments that improve soil properties and their relation to enriching Pi growth with more penetration to plant roots for enhancing protection were also investigated. The results revealed that both treatments of Pi into autoclaved and non-autoclaved soil infested with Fo and supplemented with 2.5 and 5.0% (w:w) of bagasse ash (BA) and/or press mud (PM), significantly improved soil proprieties, promoted the growth and protected cucumber plants against FW. By light microscopy, the spores of Pi were found in the roots of the protected plants (28-days old) after staining of hand sections with trypan blue. In the same tissues, the presence of Pi was also detected by PCR. DNA was extracted from mycelium grown *in vitro* or from plant roots using the DNeasy® Plant mini Kit. The amplification of an annotated sequence of the β-tubulin gene of the designed specific primers yielded a band of 751 base pairs in length that was also present when colonizing the roots by the fungus was assayed. The beneficial effects on the growth and defense status of protected plants were noticed following the lack of the antagonistic effect of Pi against Fo, which was confirmed *in vitro* test, demonstrating an induction of resistance by Pi could be occurred. Moreover, the penetration rate of Pi to the cucumber roots of the treated plants (10 samples in each treatment) against FW determined by microscopy and/or PCR with DNA extracted from the roots was also improved (up to 70%), with increasing addition rates of BA and PM in this soil, demonstrating that the enriching of Pi could be also occurred by these materials. In shake culture, using potato dextrose broth as a medium, the addition of 2.5% water extract of these organic wastes caused an increase in Pi growth, compared with the medium alone. Moreover, the total numbers of Pi in the plant rhizosphere were highly increased, whereas Fo was decreased when increasing the rates of BA and PM up to 5.0%. Finally, based on these primarily results, It can be concluded that the fungus Pi with BA and BM improve soil properties and could be exploited to increase FW disease resistance and promote cucumber growth. Further field experiments are needed to test whether the identified treatments can manage the disease.

Key words: *cucumber, Fusarium-wilt, Piriformospora indica, organic waste, protection, resistance*

MASS PRODUCTION OF THE FACULTATIVE PARASITIC MITE, *AEGYPTUS RHYNCHOPHORUS*, AS A NATURAL ENEMY AGAINST THE RED PALM WEEVIL IN EGYPT

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Abstract

The present investigation studies mass production of the facultative parasitic mite, *Aegyptus rhynchophorus*, on sugar cane inoculated with fungi *Memnoniella* spp. And artifice culture from *Memnoniella* spp. Only as bio control agents against the red palm weevil in Egypt. *Aegyptus rhynchophorus* ectoparasite on pupae results in deformed adults of the red palm weevil, thus reducing damage to palms caused by the red palm weevil .A new method of mass production of facultative parasitic mites is easy for Egyptian farmers to apply. *Agyptus rynchophorus* (Family: Trachyuropodidae) was propagated on sugar cane inoculated with fungi and with cultures from fungi only. The aim was to determine the level of success of mass production of *Agyptus rynchophorus.* The duration of tray was 30 days, and the unit was one tray. Every unit has five pieces from sugar cane and unit from fungi was one petri-dish from PDA. The number of parasites increased two fold with sugar cane inoculated with fungi and the culture from fungi only. The researchers determined biological aspects such as life cycle, type of progeny, number of deposited eggs, oviposition period, pre-oviposition period, fecundity, incubation period and behavior. The results was promise in propagative of mite .the life cycle ranged from 13-15days in female, 9-16 in male, type of progeny five females per one male in one fold on culture of fungi and number of deposited eggs ranged from 30 to64 in one fold on sugar cane and culture of fungi only respectively.

Key words*: Red palm weevil (R.P.W), Aegyptus rhynchophorus, Rhynchophorus ferrugineus, mass production, biological aspects.*

CORRELATION BETWEEN STORAGE PERIOD AND SOME BIOLOGICAL AND CHEMICAL PROPERTIES IN THREE QUINOA LINES SEED

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Abstract

Quinoa is a very promising crop in Egypt, especially in new reclaimed or poor salty soil areas where many other crops cannot be cultivated. The present work was designed to illustrate different biological and chemical changes may be occurred during storage periods in quinoa seeds. Three different quinoa lines seed were stored for zero, 1, 2, 3 and 4 years. Stored seeds, for different periods, were used to determine viability, water content and fungal population on seeds. Chemical analysis for nutrient components i.e. carbohydrates, fats and proteins were determined. Special attention was paid to aflatoxin content in stored quinoa seeds. Aflatoxin was determined in stored seeds under low and high relative humidity (RH) conditions. Aflatoxin was also determined in whole seeds, peeled seeds (without saponin) and in bran obtained after peeling seeds (with high content of saponin) to illustrate different factors lead to aflatoxin accumulation in stored seeds. Obtained data showed that percentage of water in seeds and germination were reduced by increasing storage period. Fats and proteins were also reduced by increasing storage period whereas slight increase was noticed in carbohydrates. Saponin was drastically reduced by increasing storage period. Fungal population was increased by increasing storage period. No or very low traces of aflatoxin B1 were detected in whole quinoa seeds, peeled seeds or bran of quinoa seeds, when these materials were stored at low RH (30- 37%). When whole quinoa seeds were stored at high RH (65 – 72%) all aflatoxin types were detected in considerable high values.

Keywords: *Quinoa, Storage, Saponin, Aflatoxin, Chemical changes*.

EDUCATION IN SYSTEM ORIENTED SCIENCE: MASTER CROP PROTECTION AND ERASMUS MUNDUS MASTER PLANTHEALTH AT THE UNIVERSITY OF GÖTTINGEN IN GERMANY

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Abstract

The demand for stable and increasing crop yields with regard to a growing world population requires innovative, effective and environmentally friendly plant health management practices. The education of highly skilled scientists and executives in sustainable crop protection, both in developed countries and in the developing world is a key factor. In 2010, an international master study programme Crop Protection started at the University of Göttingen, which is now well established and on demand from all over the world. Until present students from 30 different countries have been joining the programme. The language of instruction is English. In 2015 the International Master Degree Programme PlantHealth in Sustainable Cropping Systems was selected by the European commission for funding in the Erasmus Mundus Joint Master Degree (EMJMD) programme. This programme is jointly organized by the Universities of Göttingen (Germany), Valencia (Spain), Montpellier, AgrocampusOuest und ParisAgroTech (France) and Padua (Italy). The consortium will receive a total funding of 2.8 Mio Euro over a period of five years to provide full scholarships for highly qualified students and exchange visits of scientists. The PlantHealth Master programme is a two years world class course conducted at six universities having significant expertise and teaching experience in research-based and applied crop protection. Both programmes cooperate with federal research institutions, legal authorities and the agrochemical industry at different levels (internships, lectures and practical courses) supporting education and training of a new generation of young academics which will take the responsibility in future research and innovation in crop health management

Keywords: *Education in crop protection, International Master Programmes.*

EVALUATION OF VOLATILE AROMA COMPOUNDS AND SENSORY QUALITY OF FRESH WINE DISTILLATES FROM MUSCAT GRAPES

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Abstract

Muscat grape varieties (Vitisvinifera L.) can be characterized by geographical areas, in which grape varieties are produced. The relation between the composition of volatile aroma compounds and the sensory quality of wine distillates from Muscat grapes (Vitisvinifera L.) were analyzed in this research work. Aroma compounds determine the sensory quality of wine distillates and are essential for consumer's perception. Monovarietal wine distillates were produced after distillation, with the use of a traditional copper alembic. Four Muscat grape varieties (Vitisvinifera L.) were used. The Muscat of Alexandria, grape variety from the island of Limnos (North Aegean Sea), the Muscat of Samos from the island of Samos (Eastern Aegean Sea), the Muscat of Rio Patras from Rio (Peloponessos) and the Muscat of Hamburg (Central Greece). The volatile aroma compounds of the wine distillates were determined with the Head space GC/MS analysis, where a the sensory evaluation was performed by experts, using a special form which is used by the O.I.V (The Office International du Vin). The form is used in order to evaluate the international spirituous beverages of viticultural origin. This study represents an attempt to explain the correlation between the composition of volatile compounds and the sensory quality of fresh wine distillates on the basis of the group of volatiles, and to evaluate which of those has greater influence, negative or positive, on the sensory scores for basic properties and, subsequently, of sensory descriptions.

Key words: *Wine, distillates, varietal, Muscat, grapes.*

PATHOGENIC DIVERGENCE IN *PUCCINIA STRIIFORMIS* F. SP. *TRITICI* POPULATION, THE CAUSAL AGENT OF WHEAT RUST IN IRAQ

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Abstract

Yellow rust biological trap nurseries were planted in different locations representing the mainwheat growing areas in Iraq. The plants were exposed to the natural population inoculum of the pathogen in the fields. Diseases scoring were conducted by recording disease severity and infection types on each genotype at different stages of wheat development. Yellow samples collected from the commercial wheat fields from different locations were sent to the Global Rust Center for race analyses. Virulence analysis of *Pucciniastriiformis* f. sp. *tritici*population, revealedvirulence detection against the known resistant genes *Yr2*, *Yr6*, *Yr7*, *Yr9*, *Yr18*, *YrA*, *Yr20*, *Yr21*, *Yr27*, *Yr28*, *Yr29* and *Yr31*at adult plant stage in Sulaimania, while virulence against the known resistant genes*Yr2*, *Yr6*, *Yr7*, *Yr9*,*Yr SD*, *YrSP*,*YrA*, *Yr21*, *Yr27*, *Yr28* and*Yr31*, were detected in the natural populations of *P. striiformis* f. sp. *tritici* at adult plant stage Nineveh.Virulences were also detected against the known resistant genes *Yr5*, *Yr6*, *Yr7*, *Yr9*,*Yr20*, *Yr21*, *Yr27*, *Yr28* and *Yr31*in Babylon and against *Yr2*, Yr5, *Yr6*, *Yr7*, *Yr9*, *Yr18*, *YrA*, *Yr20*, *Yr25*, *Yr28*, *Yr29* and *Yr31*in Diyala.Out of 21Yr samples sent to GRRC for race analysis, 10 samples were recovered while 11 samples were failed to be recovered. Two pathotypes (races) were prevalent in *P. striiformis f. sp. tritici* population, the first one had virulence against *Yr2*, *Yr6*, *Yr7*, *Yr8*, *Yr9*,*Yr27* andAvS while the second one had virulence against *Yr2*, *Yr6*, *Yr7*, *Yr8*, *Yr9*, *Yr25*, *Yr27* and AvS at seedling stage.

Keywords: *Yellow Rust, Triticumaestivum, Resistant genes, Pathogen variability, Iraq.*

FIELD EFFICACY OF BEAUVERIA BASSIANA AND LECANICILLIUM LECANII ISOLATES AGAINST JASMINE WHITEFLY, ALEUROCLAVA JASMINI

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Abstract

The jasmine whitefly, *Aleuroclava jasmini* was recorded for the first time in Iraq on citrus trees after its outbreak in July 2001, and then it soon spread and became endemic in all citrus-growing orchards. Since then, insecticides were the only method of control suggested and practiced, hence population densities of *A. jasmini* were still high. Accordingly, the current research aim to evaluate field effectiveness of *Beauveria bassiana* and *Lecanicillium lecanii* isolates as biological control agents against jasmine whitefly, *Aleuroclava jasmini* infested citrus trees. Field experiments were carried out on three different locations. Fifteen orange trees, heavily infested with jasmine whitefly, were chosen in each trial site. The trees were fully sprayed with about 3L each of the conidial (10^7 conidia /ml) water suspension and 15 ml Tween 80, of *B. bassiana* and *L. lecanii* isolates separately. After one and two weeks of treatments random samples of leaves from each replicate and control treatments were examined and the numbers of eggs and nymphs were recorded, in addition to the number of infected individuals. Results indicated that parasitization percentages of *B. bassiana* on eggs and nymphs were relatively comparable to that of *L. lecanii* with some differences between locations. The parasitization percentages of eggs were, in general significantly lower than that of nymphs. It was found that parasitization of both tested fungal species, increased significantly with time. The results showed the probable negative effect of high temperatures and low humidity on both fungal parasitization potentials. It could be concluded that both species of entomopathogenic fungi, *B. bassiana* and *L. lecanii*, used in this investigation are good candidates to be introduce into the integrated pest management program of jasmine whitefly, *Aleuroclava jasmini* on citrus taken into considerations: Initiating treatments against the early stages of the pest to prevent population build up and targeting pest populations developing under moderate environmental conditions.

Keywords: *Aleuroclava jasmine, Beaveria bassiana, Lecanicillium lecanii.*

FIELD EFFICACY OF SOME INSECTICIDES AGAINST THE JASMINE WHITEFLY-*ALEUROCLAVA JASMINI* ON CITRUS

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Abstract

The citrus fruits consider the second most important in between other fruits which have nutritional and economic importance. Citrus trees exposed to infestation by harmful insect pest species, the jasmine whitefly (*Aleuroclava jasmini*) causing evaluated damages to the trees and their total production through their sucking of cells sap, in addition to growth of sooty mold on leave surfaces which affect negatively both respiration and photosynthesis. The field efficacy of eight different kinds of insecticides with various modes of action against the jasmine whitefly (*A. jasmini*) infested citrus trees in orchards in Iraq in the 2016 season. The results indicated that the recommended dose for each insecticide showed a high efficacy (88- 98%) in reducing numbers of *A. jasmini* adults after one week of treatment, reaching 0.5-9 insect per leaf compared to 41.9 in the control treatment. The efficiency against *A. jasmini* eggs and nymphs together ranged between 87% and 88% after two weeks of treatment. These results will be used in the control program for this pest to help implement pest management practices and reduce chances of resistance development.

Key-words: *Efficacy, insecticides, Jasmine whitefly, Aleuroclava jasmini, citrus.*

DETERMINATION OF THE EFFICIENCY OF ULTRASOUND DECONTAMINATON OF *BACILLUS CEREUS* ON LETTUCE LEAVES

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Abstract

The consumption of fresh vegetables has increased in the past few decades. The main transmission of pathogens to vegetables is through cross contamination, faecal contamination and food handling. One of the most important pathogen of fresh products is *Bacillus cereus*. Ultrasound technology has been experimented as a decontamination method for ready to eat products. It has been shown, that ultrasound can be used to influence pathogen viability activity. The aim of this study was to evaluate the microbial reduction of *B. cereus* by different ultrasound configurations tested on the surface of lettuce leaves. *Bacillus cereus* was used in a spore and vegetative cells form. The inoculum was prepared from colony and placed onto Tryptic Soya Agar. Three treatment regimens of 300 W and 600 W were used in the first method, which has shown, that the power of ultrasound has effect on bacteria. There was no significant difference in control and *Bacillus cereus* samples. Different time and power regimens were used during the second method. The processing time and power modes used were - 5, 10, 15 and 20 minutes and 300 W and 600 W. After treating samples for 5 min with 300 W amount of *Bacillus cereus* was reduced from $(4,0\pm0,7)\times10^3$ to $(8,0\pm0,7)\times10^0$, after increasing power up to 600 W bacteria count was reduced to $(5,0\pm0,7)\times10^0$ In conclusion, the most efficient way to destroy pathogens was with time regimens, not the power modes.

Keywords: *lettuce, food safety, ultrasound, Bacillus cereus.*

Acknowledgements

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APPLICATION OF IMMOBILAZED PEDIOCOCCUS ACIDILACTICI LUHS29 FOR SAFER WHEAT-BARLEY SOURDOUGH BREAD PRODUCTION

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Abstract

The aim of study was to evaluate the potential of apple pomace to enhance stability of *Pediococcus acidilactici* LUHS29 in case to apply the immobilized cells in barley sourdough fermentation for functional bread production. Isolated strain was phenotypically characterized by the growth and acidification rate, carbohydrate metabolism and resistance to acidic conditions. The effect of immobilized cells on antioxidant properties of barely sourdough and on the acrylamide content in wheat barley bread was evaluated. The phenotypic and molecular testing indicated *P. acidilactici* LUHS29 having a versatile carbohydrate metabolism and acid resistance. The number of viable cells after immobilization and refrigerated storage of the order 107 CFU/g was recorded for spray-dried powder. Saccharification with Cellustar XL prior to fermentation significantly affected sourdough acidity parameters, increased the lactic acid production, and improved the viability of immobilized cells. Lacto-fermentation of barley slightly affected β-glucan solubility, moreover drastically increased the total phenolic compounds content and radical scavening activity. The use of barely sourdough at a level of 10% could reduce acrylamide content in bread up to 44% and retard bread staling process. The application of apple pomace immobilized LAB could have the future impact for the food industry due to the bioactive potential.

Keywords: *Apple pomace, immobilization, fermentation, bread, acrylamide.*

APPLICATION OF THE RRLC-UV-DAD METHOD FOR DETERMINATION OF CAPTAN, FOLPET AND METALAXYL RESIDUES IN TABLE GRAPES

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Abstract

Viticulture is one of the leading agricultural sectors in the Republic of Macedonia and due to the favourable climate the grapes have remarkable quality and a significant export potential. To achieve increased production of quality grapes, among many other conditions, protecting vines from diseases plays a very important role. Captan, folpet and metalaxyl are among the most commonly used fungicides to protect vines from diseases. This paper presents the application of the HPLC (High Performance Liquid Chromatography) method for simultaneous determination of captan, folpet and metalaxyl residues in table grape samples using UV-VIS DAD (ultraviolet-visible diode array detector). The target residues were extracted with acetone by ultrasonication, and then cleaned-up using liquid-liquid extraction (LLE) and solid-phase extraction (SPE) on Supelclean ENVI-18 SPE tubes. The developed method was validated by testing linearity, precision, accuracy, the limit of detection (LOD) and quantification (LOQ). The method had a good linear relationship in the range of 1.40–2.40 mg/kg for metalaxyl, 0.014–0.024 mg/kg for captan and 0.014–0.024 mg/kg for folpet. The precision was evaluated for the retention times, peak areas and peak heights of the investigated pesticides. Under the established condition, the recovery of metalaxyl, captan and folpet was 93.90%-103.49%, 90.55%-105.40%, and 97.48%-101.43%, respectively. The proposed method was successfully applied to the monitoring of the investigated pesticides in table grape samples from ten different varieties (white, red and pink), taken from three regions in Macedonia. The obtained results show that folpet was the most detected fungicide in the analysed grape samples, and its concentrations were less or equal to the maximum residue level (MRL), according to Regulation (EC) No 396/2005.

Key words: *HPLC-UV-DAD, pesticide residues, grape samples*

RESULTS OF HARMFUL INVERTEBRATE ORGANIZAMS CONTROL IN HORTICULTURAL CROPS IN MACEDONIA

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Abstract

Nematodes and insects on vegetable crops are subject on regular controls in the State Phytosanitary Laboratory (SPL). These pests are a potential danger for the successful production of cabbage, tomato, pepper, cucumber in the Territory of the Republic of Macedonia. Therefore SPL control entering products through imports from other countries across borders. The use of uncertified planting material and seedlings by unauthorized persons is also a risk that greatly complicates the emergence control and spread of free living nematodes and insects. The effect of green manure and using biofumigant in combating against nematodes and insects is a scientific branch given the attention it deserves taking into account the increasing tendency of getting ecologically clean agricultural products without the presence of residues of hazardous man-made chemicals. Surveillance and the presence of free living nematodes: *Meloidogyne incognita, M. javanica, M. arenaria, M. hapla* and insects: *Spodoptera littoralis, Bemisia tabaci, Thrips palmi, Liriomyza bryoniae*, *L. huidobrensis*, *L. trifolii*, *Tuta absoluta* in vegetable crops in the State Phytosanitary Laboratory have been conducted by applying accredited methods. Monitoring for the presence of nematodes and insects were performed for the following locations: North-West region, South-East region, Pelagonia region, Skopje region, borders crossing Deve Bair, Blace, Kafasan, Tabanovce and Bogorodica for the period 2015 and 2016.

Keywords*:* *nematodes, insects, potential danger accredited methods.*

ACARICIDAL EFFECTS OF DIFFERENT PLANT PARTS EXTRACTS ON *EUTETRANYCHUS ORIENTALIS* (ACARI: TETRANYCHIDAE) UNDER LABORATORY CONDITIONS

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Abstract

Eutetranychus orientalis is one of the serious pest of citrus in the world. This mite feeds on leaves causing damage in chlorophyll and producing white spots that may become more or less coherent with time. Recently this mite was detected in Morocco. To fight *E. orientalis*, farmers frequently use synthetic pesticides. Presently, the use of these pesticides leads to the emergence of resistance to pesticides and damage to human health and environment. Therefore, the alternative method for control of *E. orientalis* is needed. As an alternative to synthetic pesticides, the use of natural products can be regarded as a mean to reduce the negative impacts of synthetic pesticides. Most of natural pesticides are environmentally non persistent and nontoxic to humans. Plant extract is one of these effective natural products . The objective of this study was to evaluate the effect of aqueous extracts of six plants on female of *E. orientalis* under laboratory conditions. All the extracts exhibited significant adult mite mortality compared to control. *Eucalyptus globules* (Leaves), *Schinus molle* (seeds), *Zingerber officinalis* L. (roots) and *Jatropha curcus* L. (seeds) extracts showed significantly higher mortality rates more than 85%, as opposed to those of *Pelargonium graveolens* L. (Leaves) and *Rosmariums officinalis* L. (Leaves), that did not exceed 64%. Our results show that several plant extracts have good potential for acaricidal activity and are worthy of further investigation.

Key words: *Eutetranychus orientalis, aqueous plant extracts, mortality, acaricidal activity.*

PATHOGENICITY OF *CONIELLA MUSAIENSIS* VAR. *HIBISCI*, A CAUSAL AGENT OF ROSELLE LEAF SPOT DISEASE IN MAKURDI, CENTRAL NIGERIA

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Abstract

A leaf spot disease was observed in Benue State, Nigeria in the 2013 cropping season. Leaves of infected plants appeared water-soaked. These are usually small, irregular and light brown. These spots increased in size covering the leaf surface and bleaching it. These spots eventually become darkened, necrotic and distorted. Affected leaves last for only three days and dropped off. The pathogen was isolated from infected leaves, seeds, crop debris and soil on potato dextrose agar supplemented with streptomycin sulphate (PDAS). The pathogen was identified as *Coniella musaiensis* var. *hibisci* by the Global Plant Clinic in the United Kingdom (GPCW No. /w 9181). Symptoms were reproduced 24 hours after artificially inoculating wounded leaves of the accessions (Acc_1, Acc_3 & Acc_4) tested. No significant ($p=0.05$) difference was noticed among the accessions with regards to disease severity. The infected leaves were defoliated after 72 hours. It was noticed that the disease did not spread to newly emerged leaves after the dropping of the infected ones. The pathogen had no preference for side of leaf as reaction to inoculation of the upper and lower epidermis did not show any significant ($p=0.05$) difference. On natural infection, the disease appeared sporadically two weeks after seed germination and formation of leaves and progressed rapidly when rainfall was regular. Progression ceases once there is low humidity. This fungus has been previously reported elsewhere in the country but this is its first report in Benue State, Nigeria

Keywords: *leaf spot, Coniella musaiensis var. hibisci, Hibiscus sabdariffa L., accession, inoculation.*

MONITORING DIFFERENT FAUNA ASSOCIATED WITH SUNFLOWER (*HELIANTHUS ANNUUS* L.) VARIETIES USED IN CUT FLOWER TRADE IN SOUTH FLORIDA, USA

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Abstract

Sunflower (*Helianthus annuus* L.) is a potential cash crop for the southeastern United States for production of cooking oil or biodiesel. Field experiment was conducted during spring season 2014 at Tropical Research and Education Centre (TREC) at homestead, Florida to monitor different insects on four different sunflower cultivars i.e. Sunrich Lemon, Sunbright, Sunrich Orange and Russian Mammoth. While monitoring, no attempt was made to collect all the available individuals, only the representative species of each individual was collected since the basic purpose of the study was to document all the existing arthropod species on sunflower in the area. For collection of different species, standard entomological practices were adopted and eventually all the collected fauna were deposited in the insect collection of Laboratory of Entomology, Tropical Research & Education Center, Homestead. During the investigation, several pests, natural enemies and pollinators were identified. Several pests were identified during the course of experiment. The major pests were *Agalia nielsoni* and *Agalia albidula* (Ciacadidae), *Bemesia tabacii* (Aleyrodoidea), *Aphis* Spp. (Aphididae) and *Halictus brachtatus* (Miridae) blackbirds (red-winged blackbirds, Agelaius phoeniceus L.; common grackles, Quiscalus quiscula L. and some other blackbird species). Other pests included stem weevil (Cylindrocopturus adspersus LeConte) and head clipping weevil (*Haplorhynchites aeneus Boh*.). in addition to pest species, natural enemies were also reported which mostly consisted of ladybird beetle, green lacewing, praying mantis, syrphid flies, and certain species of spiders.

Keywords: *Helianthus annuus, insect pests, cut flower, South Florida.*

SALT STRESS IMPACT ON PHYSIOLOGICAL AND BIOCHEMICAL PARAMETERS OF WHEAT CULTIVARS

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Abstract

Salt stress is one of major environmental stress which affects wheat plant growth and development. There is a need to develop salt tolerant wheat varieties through morphological, physiological and biochemical screening. This study was conducted to evaluate wheat genotypes (Pasban-90, Local white, Frontana and Chakwal-97) at seedling stage and vegetative stage against control and salt stress in germination and hydroponic experiment. In germination experiment seedling was tested against 50 mM, 75 mM, 100 mM, 125 mM and 150 mM salt levels under laboratory condition. Results of germination experiment show thatgradual increase in salt significantly reduces seed germination percentage, germination index, mean daily germination and seedling vigor index of Frontana, Chakwal-97, Pasban-90 and local white, respectively. So, seed germination and seedling growth showed more susceptibility towards high salt level. In hydroponics, genotypes were analyzed under two treatments of control and 150 mM salt stress. High salt levels significantly affect the root length, shoot length, fresh weight, dry weight and total chlorophyll content. A remarkable decrease in relative water content (54%), membrane stability index (33%), osmotic potential (37%), waterpotential (35%), total chlorophyll content (11%), chlorophyll a (60%) and chlorophyll b (56%) were observed at 150 mM over control. Proline content, sugar content, protein content, peroxide dismutase (POD), super oxide dismutase (SOD) and catalase (CAT) activity significantly increased under salt stress. Local white and Pasban-90 show better germination and seedling growth at high salt levels. Therefore, they possibly will tolerate moderate levels of salt.

Keywords: *Salt stress, Wheat, SOD, Chlorophyll content, Amino acids.*

EFFECT OF PLANT CHARACTERS IMPARTING RESISTANCE IN BT AND NON-BT COTTON CULTIVARS AGAINST SUCKING INSECT PESTS

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Abstract

Six cotton cultivars three Bt, 802,113 and 196 and three non Bt, FH-1000, CIM-496 and CIM-554 were studied to check the relative resistance of these cultivars against sucking insect pest Jassid, Whitefly, and Thrips. Study was done at Entomological Research Area, University of Agriculture Faisalabad, Pakistan in 2011. Randomized Complete design was used with six treatments and three replications. Data regarding Jassid, whitefly and thrips populations were taken from upper middle and lower leaves at three different places in each replication. The data regarding physic-morphic characters of plants number of gossypol glands, hair density and length of hair on leaf lamina, midrib and veins will be counted by selecting three plants from each plot at random. Highest populations of Jassid was observed on cultivars CIM-496 while minimum populations of Jassid was recorded on cultivars Bt-802 and FH-1000. In case of whitefly CIM-496 emerged to be most vulnerable genotype while Bt-802 was proved as resistant followed by Bt-113 and FH-1000. Maximum populations of Thrips was recorded on cultivars CIM-554 and Bt-196 whereas minimum populations was observed on cultivars FH-1000 and Bt-802. Correlations between Jassid and thrips populations and physic-morphic characters of plants showed that gossypol glands on leaf lamina, midrib and veins of upper, middle and lower leaves, trichome length of lamina and veins of upper and lower leaves and also leaf lamina thickness of upper and lower leaves played a significant and negative role towards Jassid and thrips population and non-significant role towards whitefly populations.

Keywords: *Bt, Cotton, Plant characters, Resistance, Sucking insect pests.*

IMPACT OF SILVER NANOPARTICLE ON AGRONOMICAL AND BIOCHEMICAL PROFILING OF CANOLA

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Abstract

The current study was design with aim to explore the potential of nanotechnological based agronomic practices to enhance the oilseed crop production. This includes a comprehensive study of the impact of silver nanoparticles (AgNPs) on canola by using various physiological and biochemical approaches. Completely Randomized Design (CRD) was followed for the experiment. Green synthesis of AgNPs was carried out followed by various characterization like UV visible spectrophotometry, XRD, FTIR and SEM for nanoparticles morphological studies. Different treatments of AgNPs were applied on canola crop at different growth stages. Concentration like 0ppm, 5ppm, 15ppm and 25ppm were used in the current experiment. Significant result was observed on 5ppm and 15 ppm. Chlorophyll content was double as compared to control. Proline, Proteins and carbohydrates are improved with 5 and 15 ppm. Oil content was increase on 5ppm with low erucic acid and glucosinolate contents. Significant leaf area was recorded on 5 ppm. Highest plant Hight was observed on 5ppm followed by 15 ppm while the plant Hight on 25 ppm was significantly low. The fresh and dry weight were increased on 15 and 5 ppm respectively. Significant increase was found in seed per pods and length of pods as compared to control. Over all the research was quite interesting and high yield output was observed as compared to control. Much more is needed to improve the canola variety.

Keywords: *Silver nanoparticle, AgNP, Canola, nano-agrobiotechnology.*

EFFECT OF SELENIUM BIOFORTIFICATION ON THE OXIDATIVE STATUS OF HEAT STRESSED LAMB'S LETTUCE

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Abstract

Heat stress (HS) due to increased temperature is a major agricultural problem worldwide. Permanently or temporarily occurring high temperatures negatively affects plant growth, disturbs physiological and biochemical processes, and in consequence lead to a drastic yield reduction in crops. Various approaches are being utilized to alleviate the negative effects of HS and the utilization of differentiated mineral nutrition is one of these methods. Although the essentiality of Se to plants is still unconfirmed, however, many researchers have reported beneficial effects of Se in different plant species. It is suggested that Se promotes metabolic activities, particularly antioxidant activities, leading to enhancing plant tolerance under stress. Therefore, we examined the effects of foliar and soil application of Se on the antioxidant status of lamb's lettuce grown under optimal (22/19ºC; day/night) or HS conditions (35/22ºC; day/night). In our study, the application of Se inducted an increase in GSH accumulation, especially under HS. However, the concentration of L-AA was not affected neither by the temperature nor the presence of Se. Moreover, in the control plants (non-supplied with Se) more than two-fold higher concentrations of free proline were accumulated under HS. On the other hand, Se fertilization contributed to about 2-fold decrease in proline content compared to non-treated with Se controls. We also measured the activity of selected antioxidant enzymes, i.e. GPOX, APOX, and CAT. Our results show that both thermal stress and Se application significantly affected their activity, especially GPOX and CAT. Therefore, we imply that exogenous application of Se can enhance the tolerance of lamb's lettuce to HS through the coordinated action of non-enzymatic antioxidants and antioxidant enzymes.

Keywords: *Selenate, heat stress tolerance, antioxidant compounds, Valerianella locusta L.*

THE HEALTH OF SNAP BEANS DURING THE VEGETATION SEASON AND THE IMPACT OF THE PATHOGENIC FUNGI POPULATION ON THEIR SEEDS

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Abstract

Snap beans are an important species among edible legumes. In field cultivation, mainly common forms of bean are dwarf varieties. During the vegetative season, plants are often attacked by fungal diseases. The aim of the studies is definition the health of snap beans during the vegetation season and the colonization of the pathogenic fungi population on their seeds in labolatory conditions. The research was conducted in 2016 on fields belonging to the Department of Phytopathology, Seed Science and Technology of the University of Life Science in Poznan (Poland), where the health of cultivars of the snap bean without the fungicide protection was evaluated. The following cultivars were used in this study: Sonesta, Crown, Gold saxa, Berggold, Supernano giallo, Golden tee pee, Liwia, Victor, Universe, Fructidor, Maxidor. Health observations were performed during the earliest flowering of the cultivars and during the harvest. There was an increased occurrence of anthracnose on the Liwia and Sclerotinia stem rot on Fructidor and Supernano giallo. In the laboratory experiments, the seeds of the collected beans were evaluated by occurring of the pathogenic fungi. Based on the morphological characteristics of the mycelium and spores, the species rating was assessed. On the seeds of the commonly found fungi of *Alternaria* spp. and *Fusarium* spp. *Stemphylium* spp. there were also species such as *Sclerotinia sclerotiorum, Botrytis cirenea* and *Colletotrichum lindemuthianum*.

Key words: *Phaseolus vulgaris L., health, pathogenic fungi.*

RESISTANCE TO STROBILURIN FUNGICIDES AND GENETIC DIVERSITY OF *PYRENOPHOR TERES* DRECHSLER FROM CENTRAL-WESTERN POLAND

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Abstract

Barley is one of the most widely cultivated crop species. The annual yield is over 140 million tons. One of the most serious diseases affecting crops of barley is net blotch of barley (NBB). It is the reason for significant yield losses. NBB is caused by plant pathogens - *Pyrenophora teres*, a species belonging to the kingdom of fungi. There are two forms – *P. teres* f *teres* and *P. teres* f *maculate* that causes different forms of the disease. One of the solutions which have been widely used to control and protect plants against *P. teres* are fungicides. However, resistance to fungicides occurs among pathogens, usually it is a result of DNA mutation. Isolates of *P. teres* from central-western Poland (five different locations) were studied. Using the PCR technique, the samples were identified as *P. teres* f. *teres*. Moreover, genetic diversity of isolates was investigated. For this purpose, the polymerase chain reaction was used with universal rice primers (URP). Next, the efficacy of azoxystrobin (QoI) fungicide against isolates of *P. teres* was studied. We conducted the sensitivity test to this fungicide. Genetic background of the resistance of some isolates was examined based on testing results. Consequently, we investigated the presence of the F129L mutation that leads to resistance to QoI fungicides. However, the F129L mutation was not detected despite apparent insensitivity of some isolates to strobilurin (QoI).

Keywords: *Pyrenophora teres, genetic variability, net blotch of barley, QoI resistance.*

MICRONUTRIENT STATUS OF NICKEL-TREATED WHITE MUSTARD (*SINAPIS ALBA* L.) AFFECTED BY DIFFERENT SULPHUR LEVELS

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Abstract

An efficient protocol of improving the micronutrient status of Ni-treated white mustard (*Sinapis alba* L.) 'Rota' with the use of intensive S-SO_4 nutrition was developed. To determine the effect of high S-SO_4 doses on the micronutrient content and translocation in plants, twelve variants of Hoagland's nutrient solution differing in the concentration of S-SO_4 (standard- 2 mM and high level- 6 or 9 mM S) and Ni (0, 0.0004, 0.04, and 0.08 mM) were tested. The researchers confirmed the scientific hypothesis on the possibility of alleviation of Ni-phytotoxicity using intensive S nutrition, based on the micronutrient status of mustard. The beneficial effect of intensive S nutrition on Ni-stressed plants was manifested by a significant rise in the content of Fe, Mn, and Zn, especially in the shoots. A significant increase was also found in the shoot B, Cu, and Mo content, whilst there were no substantial changes in the root content of these micronutrients. Simultaneously, the root and shoot Cl content remained quite stable and dropped, respectively. The intensive S nutrition of Ni-exposed mustard, in general raised the translocation of Fe, Cu, Mo, and B from the roots to the shoots without significant changes in that of Mn, Cl, and Zn.

Key words: *nickel, sulphur, nutrient solution, toxicity alleviation, white mustard (Sinapis alba).*

RESEARCH OF SORPTION ABILITY OF ENRICHING INGREDIENTS FROM AMARANTH GRAIN

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Abstract

Technologies development for use the cereals potential is one of the most perspective directions of the diet improving. Traditionally applied grain processing products are made from endosperm, which vastly decreases amount of such functionally necessary nutrients as vitamins, minerals and alimentary fiber. Whole grinded amaranth flour and extruded semifinished amaranth are proposed as enriching grain ingredients. Screening of amaranth grades about nutritional and biological value was made. Much attention is given to amaranth grade «Universal» because of high contain of protein – till 26 %. So, this grade can be used as a protein enriching ingredient. It is shown that it also has high content of alimentary fiber – till almost 9%, and rich in such physiologically important nutrients as calcium, phosphorus, iron, etc. Research of functional and technological properties of extruded semifinished amaranth was made. Water- and fat-binding abilities, solubility and emulsifying ability were studied. Based on testing recommendations about ways of using extruded amaranth in bakery technologies are given. It is proposed that flour products with extruded amaranth addition can possess functional properties. So, sorption properties towards cuprum were explored in amaranth products. Coefficients in the empirical Freundlich equation were selected for description experimental sorption isotherms. Experimental data in wider concentration range were discussed with Langmuir theory. Complex of produced researches confirmed the amaranth products functionality and expediency of its use as an enriching grain ingredient in foodstuffs, primarily in bakery products - for mass consumption and functional purpose.

Keywords: *Amaranth, sorption ability, copper sorption, enrichment.*

THE USE OF JERUSALEM ARTICHOKE FOR OBTAINING THE YEAST BIOMASS FOR FOOD AND FEED PURPOSES

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Abstract

Researches on the use of Jerusalem artichoke tubers in the production of yeast biomass for food and feed purposes have been conducted. It was revealed that inulinase activity of yeast strains of S. cerevisiae G and K. marxianus Y-1148 was 590 u / g and 150 u / g respectively at the cultivation in the inulin-containing medium. Strain S. cerevisiae G grows well in non-hydrolyzed juice of the Jerusalem artichoke obtained from fresh tubers. The juice of the Jerusalem artichoke has a high content of inulin (18.7%), phosphorus, potassium, B vitamins, biotin and can be used as a culture medium of yeast without mineral salts. The yield of biomass by culturing the yeast with aeration (30 ° C, 24 h) was 60 g / l. The addition of $(NH_4)_2SO_4$ into the Jerusalem artichoke juice (0.6%) increased the accumulation of yeast biomass up to 74.6 g /l which is 24% higher of yeast biomass grown in beet molasses medium. The stimulating effect of the Jerusalem artichoke juice on K. marxianus Y-1148 during milk whey fermentation (30 ºC, with aeration) has been established. The maximum stimulating effect (2.8 times) is shown at the 15% content of Jerusalem artichoke in milk whey and during 24 h of incubation. The use of Jerusalem artichoke increases the yield of yeast biomass and enriches it with probiotic substances. It allows replacing the traditional molasses by the Jerusalem artichoke and to reduce the cost of production by increasing the yield of yeast biomass and by excluding mineral salts.

Keywords: *Artichoke, biomass, food and feed.*

CHEMICAL CONTROL OF DOWNY MILDEW (*BREMIA LACTUCAE* REGEL) ON LETTUCE

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Abstract

The most important lettuce pathogens in our agro-ecological conditions are *Bremia lactucae*, causal of downy mildew and *Botrytis cinerea*, causal of gray rot. Bearing in mind the demanding market, different production requirements of lettuce, as well its varieties, biological assays with fungicides are very important. The experiment was set up in 2015, in the locality of Provo (Mačva, western Serbia), in the crop of lettuce Seter variety, using standard OEPP methods. Fungicide based on fosetyl-aluminum (Aliette 80 WP) has been applied in a concentration of 0.31%. Biostimulant (Megafol; applied doses 2 l/ha), and a mixture of fungicide with biostimulant were also used in the bioassay. Foliar treatment of plants was carried out by backpack sprayer, with a consumption of spray liquid of 400 l/ha. The experimental design was a randomized block design with four replications. The efficacy of the fungicide is determined by Abbott, while the significance of differences for the confidence interval of 95% was done using ANOVA. In the laboratory conditions, the physical and chemical properties (pH, suspendability, surface tension and electric-conductivity) of spray liquid fungicide and the mixture of the fungicide + biostimulant have been tested. Fungicide Aliette 80 WP, as well as a mixture of Aliette 80 WP + Megafol, exhibited a high efficiency (from 79.1 to 91.7%) in control of downy mildew (*B. lactucae*). In all treatments where the fungicide, biostimulant as well as mixtures of fungicide + biostimulants were applied, the average weight of lettuce plants (417.3 to 433.3 g) was at a significantly higher level in comparison to the control (403.6 g). Physical and chemical properties of the spray liquids fungicide and mixture of fungicide + biostimulant were within acceptable limits and there is no significant change after 24 hours of standing. Mixtures of fungicide and biostimulant, based on physical and chemical properties exhibited compatibility.

Key words: *lettuce, B. lactucae, fosetyl-aluminum, biostimulant.*

Acknowledgement

This study is a part of the project III46008, funded by the Ministry of Education, Science and Technological Development of the Republic of Serbia.

METHOD VALIDATION FOR THE SIMULTANEOUS DETERMINATION OF ACTIVE INGREDIENTS OF ACARICIDE ABAMECTIN AND ETOXAZOLE IN PESTICIDE FORMULATIONS

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Abstract

Formulation of the products based on active ingredients abamectin and etoxazole and lack of the official CIPAC (*Collaborative International Pesticides Analitycal Council*) and/or AOAC (*Association of Official Agricultural Chemists*) methods for their determination as individual components in pesticide products, led to need for development of new methods. Abamectin is a contact and dygestive insecticide/acaricide which belongs to the chemical group of avermectins, while etoxazole is an acaricide belonging to the group of oxazolines. In this study, simple, rapid and precise method for simoultaneous determination of abamectin and etoxazole in pesticide products was developed and single-laboratory validated. For the analysis, LC system an Agilent Technologies 1100 Series with Zorbax SB-C18 column (5 μm, 250 mm × 3 mm internal diameter) was used. Analytical standards of abamectin and etoxazole and samples were diluted in acetonitrile and ultrasonically dissolved. The best separation was achieved using a mobile phase consisting of 0.5% CH_3COOH/acetonitrile (30/70), at a flow rate of 0.75 ml/min and UV detection at 254 nm. Column temperature was 25 °C, injected volume was 1 μl. Retention times for abamectin and etoxazole were 5.348 min and 4.244 min, respectively. Under the selected conditions, the repeatability of the method expressed as relative standard deviation (%RSD) was 0.41%. The accuracy of the method, determined from recovery experiments through standard addition procedure, was found to be acceptable as $t_{cal}<t_{crit}$. The precision of the method was considered acceptable as the RSD_r was lower than the RSD_R, calculated by the Horwitz equation.

Keywords: *abamectin, etoxazole, HPLC-DAD, determination.*

THE ORIGIN AND CONTENT OF NI IN VERTISOL SERBIA

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Abstract

This paper presents the results of 10 representative samples of Vertisols collected from different purpose areas of ten locations in Serbia (meadows and fields). The aim of this study was to determine the level of Ni in soil types Vertisols and its accumulation in plants Avena sativa grown on smonitza Serbia, in order to obtain information on safety of these nutrients The following basic chemical properties were examined: active soil acidity (pH in H_2O), substitutional acidity (pH in 1M KCl), $CaCO_3$ content, humus content, content of available forms of phosphorus and potassium, content of clay, CEC, content sand and silt. The paper shows the characteristics, origins, behaviour and content of total and available nickel in the soil. Average value of total nickel in the analyzed soil samples was above the MAC. Average value of the total nickel content of the soil samples was above the MAC, and amounts to 54.89 in the soil from the field and 56,11 mg kg^{-1} of the soil from a meadow, while the average value of readily available nickel was 2.97 mg kg^{-1} in the soil from the field and 2.77 mg kg^{-1} in the meadow land. The share of available nickel in total nickel was a good indicator of the origin of soil contamination. Since it is determined a percentage of the total nickel in the readily available form (4,75 % in the field and 5,88 % from a meadow) is determined, it may be concluded that the Ni content in the soils of Serbia is of natural origin and that there is no danger of infiltration of the elements in the food chain.

Key words: *Vertisol, chemical properties soil, plants, nickel*

PRELIMINARY IDENTIFICATION OF EUROPEAN CORN BORER PHEROMONE RACES AND FLIGHT DYNAMICS IN BEČEJ, NORTHERN SERBIA

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Abstract

European corn borer (ECB) is a pest of maize present worldwide in maize fields. It is a polyphagous pest, but maize (*Zea mayis*) is the main reproductive host. In Europe and North America Z, E and Hphero-raceare determined. Aim of the study was to identify the presence and flight dynamics of different ECB races in main corn production region in Serbia. In experimental field (Bečej, northern Serbia) delta pheromone traps and lures of all three strains (Csalomon, Hungary) were placed and empty traps were the control. Traps were inspected weekly and sticky bases replaced or cleaned, while lures were replaced monthly. Observation indicates at presence of all three pheromone races in northern Serbia. The largest number of caught ECB males belonged to Z strain (total 102 specimens), 12 specimens belonged to H strain and the smallest number (3 specimens) to E strain. The first catches of Z males were registered on 2nd June (3 specimens) and the last on 9th October (34), the largest number was caught on 16th August (54). First specimens of E strain were caught on 16th August (2) and second on 9th October (1 specimen). Catches on H traps were registered on 16th (9) and 27th August (3 specimens). According to these preliminary results the largest number of caught specimens on the territory of Vojvodina belongs to the Z pheromone strain of ECB. Detailed GSMS analyses will precisely identify the which ECB strains are present in northern Serbia and confirm these preliminary results.

Keywords: *European corn borer, Pheromone traps, Flight dynamics, Pheromone races GSMS analysis.*

ALLELOPATHIC EFFECTS OF ALIEN INVASIVE PLANTS

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Abstract

Plant exudates and secondary metabolites have a variety of biological actions. This is measurable through allelopathic, herbicidal, toxic (human and animal) and insecticidal activity. Allelochemicals are products of plants, algae, bacteria and fungi and affect the growth and development of agricultural crops. Positive and negative effects on cultivated plants depend on the allelochemicals' chemical composition, i.e. different compounds released from different plants part (leaves, roots, and stem) with different mechanisms. The aim of this study was to determine the potential allelopathic effects of three widespread invasive species in area of the Čačak city *Ailantus altisima, Portulaca oleracea* and *Ambrosia artemisiofolia* on the seed germination under laboratory conditions. The crude ethanolic extracts *A. altissima*, *P. olerace* and *A. artemisiofolia* were prepared in aqueous solution concentration 0.1%, 1% and 5%. Allelopathic effects were measured by determining seed germination % of clover, alfalfa and lettuce in the exposition to plant extracts. After 96h allelopathic effect of *P. oleracea* extract and *A. altissima*was observed. Extracts of these herbs have demonstrated an inhibitory effect on germination of wheat grains and stimulating the germination of barley grains. Ethanol plant extract of 5% solution *P. oleracea* at the same time had the strongest inhibitory effect on germination of wheat grains and strongest stimulating effect on germination of barley grains. Extracts of *A. artemisiifolia* did not have allelopathic effectin any concentration.

Keywords: *Invasive plants, allelopathy, Clover, Alfalfa, Lettuce.*

MOLECULAR CHARACTERIZATION OF *PSEUDOMONAS SYRINGAE* PV. *CORIANDRICOLA* ORIGINATED FROM CARROT, PARSLEY AND PARSNIP

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Abstract

Recent studies have been made to investigate some molecular features of plant pathogenic bacteria *Pseudomonas syringae* pv. *coriandricola*. This pathogen causes bacterial leaf spot disease on some members of family *Apiaceae*, such as coriander, carrot, parsnip and parsley. Initial symptoms are small water-soaked lesions on foliage, which then develop into spots varying in shades, tan, brown or black. The spots are usually limited by leaf veins having an angular appearance, and visible from both sides of leaves. Under favorable conditions of high humidity, spots may spread and cause foliage blighting. *P. s.* pv. coriandricola strains used in this study originate from carrot, parsley and parsnip. Repetitive element PCR fingerprinting (rep-PCR), using REP, BOX, ERIC, $(GTG)_5$ and SERE primers, and randomly amplified polymorphic DNA-polymerase chain reaction (RAPD-PCR) using M13 primer were used to determinate genetic polymorphism between tested strains. Further molecular features were observed on the basis of a multilocus sequence analysis (MLSA) by sequencing key genes for *Pseudomonas syringae* (*gap*A, *glt*A, *gyr*B, *rpo*D). DNA profiling revealed identical banding patterns for all tested strains. The sequence and phylogenetic analysis of three MLSA genes (*gap*A, *gyr*B, *rpo*D) showed homology with pathotype strains *P. s.* pv. coriandricola *deposited in PAMDB (http://genome.ppws.vt.edu/cgi-bin/MLST/home.pl).* Sequencing of *glt*A gene determined the isolates above the species level (*P. syringae*). Our results indicate that *gap*A, *gyr*B and *rpo*D genes are more discriminatory then *glt*A and their usage is therefore suggested for further genotypic studies of this pathogen.

Keywords: *Bacterial leaf spot, Apiaceae, rep-PCR, MLSA.*

Acknowledgment

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PATHOGENICITY OF *BEAUVERIA BASSIANA* (ASCOMYCOTA: HYPOCREALES) ISOLATES AGAINST THE RUSSIAN WHEAT APHID (*DIURAPHIS NOXIA*)

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Abstract

The entomopathogenic fungus *Beauveria bassiana* (Balsamo-Crivelli) Vuillemin (Cordycipitaceae) is known to regulate a wide host range of insect populations. The aim of the current research task is to investigate pathogenicity of *B. bassiana* and evaluate its biocontrol potential against the *Diuraphis noxia* Kurdjumov (Hemiptera: Aphididae). Twelve *B. bassiana* isolates, maintained in ARC-Small Grain's EPF Culture Collection (Bethlehem, South Africa) were pre-screened for pathogenicity against adult *D. noxia*. Conidial viability test was performed to assess strain quality. The best-performing strain (Rooi 495) was selected based on conidial germination percentage of >95 and further compared with Rooi 444, from a commercial product (Eco-Bb®). Pathogenicity of these isolates was evaluated on 100 adult aphids per fungal dose (20 aphids x 5 replicates/strain) for three times. Conidial suspension concentrations for the two strains were adjusted to 1×10^8 conidia/ml. Two concentrations of 1×10^8 and 5×10^7 conidia/ml per strain were topically sprayed on aphids using Burgerjon precision spray tower resulting in dose counts *ca.* 2000 and 900 conidia/mm^2, respectively. Control aphids were treated with sterile water amended with (0.01% Break-Thru®) and Aphox® (positive control). Treatment mortality for Rooi 495 at the dose rate of 2041 ± 65.43 conidia/mm^2 occurred at 4.08 ± 0.26 days with mortality rate of 52.6 ± 9.66. Control mortality (21 ± 1.2) was corrected using Abbott formula and overt mycosis of 39.9 ± 12.16 was obtained. This suggests that R495 is pathogenic and could be integrated for IPM strategy as a biocontrol agent against *D. noxia*.

Keywords: *Pathogenicity, Beauveria bassiana, aphids, mortality, biocontrol agent.*

ALOE VERA PLANT: CHEMICAL ANALYSIS

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Abstract

The *Aloe vera* plant (*Aloe barbadensis* Mill.) has been used in functional nutrition for decades. The plant produces a colorless extract composed of three fractions of different molecular sized mucopolysaccharides, and two aloin fractions (Aloe-emodin and barbaloin/ isobarbaloin). While the first three are beneficial for human health - they stimulate the immune system - the last two produce diarrhea symptoms and, possibly, nephritic problems. The aim of this work was to chemically analyze the fresh juice contained in the plant, so as to identify and quantify the mucopolysaccharide (AVMP) and the aloin (the anthrachinon Aloe-emodin, barbaloin and isobarbaloin) on a regular and temporary basis (monthly, for a year). An analytical method capable of identifying and quantifying has been developed, based on the HPLC technique. For this, an OHpak SB-806 HQ Shodex column was installed in a VWR-Hitachi, Elite La Chrom liquid chromatograph, equipped with a pump, an automatic injector, a refraction index detector and an UV detector. Fresh *Aloe vera* leaves were collected monthly at the home property of Antonio del Rosario (Arinaga, Gran Canaria, Canary Islands). The concentration of AVMP fluctuated throughout the year between 940 ± 40 and 21600 ± 700 ppm, and yielded an annual average of 5500 ± 700 ppm, whereas the aloin fluctuated during the same period between 130 ± 15 and 776 ± 17 ppm, yielding an average value of 464 ± 17 ppm.

Keywords: *Aloe vera, Chemical analysis, Mucopolysaccharide, Aloin, Spain.*

IMPROVEMENT OF THE OXIDATIVE STABILITY OF BISCUITS BY USING POTENTIALLY ANTIOXIDANT PEPTIDES

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Abstract

There are milk-derived peptides with antioxidant activity which incorporated into biscuits might help to extend the shelf-life of the product by protecting biscuits from lipid oxidation, which is the main spoilage process that affects this kind of food. An extended shelf-life can reduce food losses and all the negative economic but, above all, social and environmental consequences derived from it. Therefore, this work aimed to assess the antioxidant effect of milk-derived peptides (Lowpept®) in biscuits for the development of a novel biscuit enriched also with phytosterols (Vitasterol®) with cholesterol-lowering effect. For this purpose, the organoleptic characteristics of this novel biscuit were evaluated and, subsequently, its oxidative stability during storage was studied in comparison to a control biscuit monitoring peroxide value (PV) and water activity (a_w). The sensory analysis showed a satisfactory overall score of 3.6±0.7 out of 5 for the supplemented biscuit. The accelerated stability studies showed significantly lower peroxide values ($P < 0.05$) for the supplemented biscuit during storage, suggesting an improved resistance against lipid oxidation compared to the control biscuit. This was likely related to the antioxidant activity of peptides. These promising results suggest that the shelf-life of biscuits could be increased with the addition of the milk peptides used in the present study.

Key words: *Antioxidant activity, Lipid oxidation, Biscuits, Food waste.*

AN ADDITIONAL NEW REGISTRATION OF THE BARK BEETLE *PHLOEOSINUS ARMATUS* RITTER AND ITS MORPHOLOGICAL DESCRIPTION IN SYRIA

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Abstract

The bark beetle *Phloeosinus armatus* Ritter from the family Curculionidae, Coleoptera is an important insect that causes significant damages on the Mediterranean cypress *Cupressus sempervirens* L. The adult insects were collected during its appearance on the Mediterranean cypress at several sites in the Eastern Ghouta near Damascus, South of Syria in autumn of 2014. The insect was morphologically described. Biometric measurements were taken for different body parts. It has a tiny body size ranged between 3.80 - 4.63 mm for male and 3.88- 4.76 mm for female. The body has a shiny chestnut color, covered with short hair. The antennae are clavate (capitate) and consist of 5 flagella. The antenna length ranged between 1.04 - 1.21 mm for male and 0.92 -1.16 mm for female. The mouth type is chewer. The legs are similar in shape and size. The tarsus consists of four segments. The tip segment is prolonged and ends with a couple of claws. The leg length ranged between 1.72 - 2.34 mm for male and 1.80 - 2.26 mm for female. This is the additional new study for this insect in Syria.

Keywords: *Bark Beetle, Phloeosinus armatus, Morphological Description and Syria.*

FUNCTIONAL RESPONSE OF THE PREDATORY THRIPS *SCOLOTHRIPS SEXMACULATUS* (THYSANOPTERA: THRIPIDAE) PREYING ON *TETRANYCHUS URTICAE* (ACARI : TETRANYCHIDAE)

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Abstract

One important method for assessing the efficacy of natural enemies is the study of their foraging behavior including functional response. It describes the rate at which a predator kills its prey at different prey densities and can thus determine the efficiency of a predator in regulating prey populations. A leaf disc bioassay was employed to evaluate the efficiency of the acarophagous thrips *Scolothrips sexmaculatus* Pergande. (Thysanoptera: Thripidae) as a biocontrol agent against the two-spotted spider mite *Tetranychus urticae* Koch (Acari: Tetranychidae). These experiments were conducted in 2016 at the General Commission for Scientific Agricultural Research (GCSAR), Damascus countryside, Syria. The predator exhibited Holling- III type of functional responses (Sigmoid) when it was offered *T. urticae* adults at five densities (5, 10, 20, 40 and 80). The Sigmoid curve indicates an increase in prey mortality with increased prey density to a plateau. The relationship can be expressed by the equation $Y= 14.692 X + 0.1099$. Based on the random predator equation, the estimated attack rate (a) was $0.07h^{-1}$ and handling time (T_h) 0.88 h. The predators increase their search activity with increased prey density, whereas prey mortality first increases with increased prey density, and then declines. The results reported here form a basis for further studies on the feasibility to incorporate *S. sexmaculatus* in integrated pest management programs against *T urticae*.

Key words: *Biological control, Scolothrips sexmaculatus, Tetranychus urticae, functional response.*

PEST STATUS OF CITRUS APHIDS IN THE NORTH AND CENTER OF TUNISIA

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Abstract

An action of research and developement, dealing with citrus aphids in Tunisia, has been started in 2014-2016 within the Framework of the Support Project of Research and Innovation System (PASRI), funded by the European Union. This paper describes the pest status of aphid species colonising the Tunisian citrus orchards, with a view to limit the dispersion of Citrus Tristeza Virus (CTV) aphid vectors in citrus areas and improve the current management strategies of citrus aphid populations. The occurrence and phenology (flights) of aphids were assessed weekly during 2014 growth season in 4 citrus producing regions (Bizerte, Boussalem, Kairouan, Mornag) by using yellow water traps (alate aphids) and sampling young shoots (apterous aphids). 125 samples were collected and 8213 aphids were caught and identified during this study. 42% of them were associated to citrus crops, including mainly three determined aphids species, *Aphis gossypii* Glov, *Aphis spiraecola* Patch and *Toxoptera aurantii* B. de F. *A. spiraecola* was the most important citrus aphid (97%) in all citrus groves since it was the most abundant in Moericke traps (41%). *Toxoptera citricidus* Kirkaldy was not detected in the above collection. Data on distribution, incidence level and seasonal abundance patterns of main citrus aphids are given. Therefore, an Integrated Pest Management (IPM) concept was proposed in order to greatly reduce the number of citrus aphid populations below the national economic threshold. Such informations are very useful for growers, extension agents, and pesticide applicators during scouting and control programs.

Key words: *aphids, CTV, Citrus, Tunisia, Seasonal abundance, Control programs*.

EFFECTS OF PHENYLACETONITRILE AND *PERGULARIA TOMENTOSA* ON BEHAVIORAND ECDYSTEROID AMOUNTS IN S*CHISTOCERCA GREGARIA*

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Abstract

Because environmental damages are associated with the use of synthetic insecticides in locust control, new environmentally approaches such as natural compounds capable of interfering with the development of target insects are becoming increasingly important. The active fraction of *Pergularia tomentosa* (AFP)was investigated by exposing (0-1 day-old) nymphs of *Schistocerca gregaria* to three concentrations 0.06, 0.24 and 0.96%. Other experiments were conducted to assess the effect of AFP and PAN (Phenylacetonitrile) in binary combination. The PAN was associated to the lethal concentrations of AFP, LC_{25} and LC_{50}, at three concentrations 0.5, 1 and 2%. Results revealed insecticidal activity of the AFP with an LC_{50}value of 0.8%. Toxicity was demonstrated by an inhibition in the circulating ecdysteroidtitres. We have also proven the importance of the receptor components EcR and RXR for successful moulting of locust nymphs into the adult stage. Toxicity tests also indicate that the adding of small quantities of phenylacetonitrile could improve the efficiency of the AFP. The PAN-treated larvae become more sensitive to the AFP. Series of experiments were envisaged to explain the mode of action of this pheromone. The results showed that nymphs became relatively hyperactive and disoriented. A significant repellent effect of PAN on nymphal stages was also found. In addition, PAN affected the composition of the hemolymph by a significant decrease in the number of hemocytes and by cell lysis. Biochemical analysis demonstrated that the PAN induced the glutathion S-transférases and reduced the activity of Acetylcholinesterase on *S. gregaria* nymphs.

Keywords: *S. gregaria, P. tomentosa, Phenylacetonitrile, Ecdysteroids, Stress biomarkers.*

DETECTION OF ENZYMATIC BROWNING ON BANANA USING COLOR ANALYSIS

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Abstract

The Enzymatic browning is a chemical process which occurs in some fruits (bananas, pears, apricots, grapes) and vegetables (mushrooms, lettuce, potatoes). It is one of the largest causes of quality loss during post-harvest handling and processing of fruits and vegetables. Enzymatic browning reduces the visual quality and can cause undesirable changes in flavour and nutrient loss. The fruit quality depends on size, color, shape and type of skin defects according to the international marketing standard. However, the color of the fruit surface is the first quality parameter for consumers. Color analysis is one of the important and extensively used techniques for detecting physical and chemical characteristics of fruits. These features are utilized for defining the shelf-life, promotion systems, mode of transportation and storage technique. The aim of this study was to detect enzymatic browning of banana by using color analysis in the conditions of room temperature and cold storage depending on time. Ripened bananas with black spots were used in the experiments. Color measurements were performed by using X-Rite Ci60 colormeter which is based on Lab measurement system. Colormeter was calibrated with a white reflective plate before the measurements. Lab color space was selected for extracting information from banana surface. Histogram analysis was utilized on different color channel. The research results indicated that color analysis can easily be used to determine enzymatic browning on bananas. Enzymatic browning rate of the cold stored bananas was lower than the bananas kept at room temperature.

Keywords: *Enzymatic browning, Color analysis, Banana, Room temperature, Cold storage.*

REAL TIME ENZYMATIC BROWNING DETECTION ON QUINCES (*CYDONIA OBLONGO*) BY USING LABVIEW SOFTWARE

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Abstract

In Turkey, nearly 110 000 tons quince fruit have been produced every year. Quality of quince fruit depends on size, color, pattern and type of skin defects according to the international marketing standard. But, the color of the fruit surface is the first quality parameter for many consumers. This is vital in the acceptance of the product in the marketplace. Enzymatic browning is one of the most important reactions that occur in fruits and vegetables, usually resulting in negative effects on color, taste, flavor, and nutritional value. So, the control of surface browning is important for protecting the quality and safety properties of fresh fruits. Enzymatic browning can be quantified using physical indicators, such as the color surface or biochemical index, for example the polyphenol oxidase activity. The aim of this study was to determine color changes with X-Rite Ci60 colormeter and skin defects in real time by using Labview software on quinces. L a b space color was used to get three color channels, lightness (L), redness (a), and yellowness (b). Especially, the L value, which has been used as a browning indicator in fruits. The color changes due to enzymatic browning on each fruit sample were determined by using color analysis, which based on webcam observation and Labview programming. The change of color values were observed day by day and also real time detection system was tested by using these quinces repeatedly. The enzymatic browning was sorted and the color changes on quinces were observed successfully. Also results obtained from study were assessed statistically.

Keywords: *Enzymatic browning, Quince, Real time video analysis, Mechanical damage*.

USE OF DIFFERENT METHODS TO DETERMINE DISEASE RESISTANCE OF SOME *VITIS* spp.

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Abstract

Fungal diseases are the most important problems that limit quality production in viticulture. Downy and powdery mildew particularly cause serious yield and quality losses in almost every grape growing region. Too many fungicides are needed for treating these diseases, whichposesa serious threat for humans and the environment. To address this problem, creating disease resistant or tolerant cultivars is suggested as most effective. Therefore, it is necessary to clarify the resistance of cultivars in terms of downy and powdery mildew. In this study, we tried to determine the resistance status of different cultivars/genotypes of Vitis against these two diseases with different methods. Natural infections and inoculation applications for downy and powdery mildew diseases had been applied for two years. The results were scored and disease severities were determined and classified according to the scale values of the cultivars/genotypes. As the second method, the existence of resistant gene regions in the cultivars/genotypes with a total of 8 different markers related to these two diseases was investigated. Finally, in addition to this, some cultivars/genotypes were examined for changes in the amounts of different phenolic components in the healthy and diseased leaves. The amount of total phenolics and antioxidants especially showed significant increases after both diseases. As theresult of the study, the researchers determined which of the cultivars/genotypes were resistant, tolerant or susceptibleto both diseases. The resistant cultivars/genotypes were mainly the cultivars from *Vitis labrusca* and interspecies.

Keywords: *Fungal diseases, Vitis spp., resistance, marker, phenolic compounds.*

RATIONAL USAGE OF PLANT EXTRACTS IN FOOD NANOTECHNOLOGY

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Abstract

Depending on the method of extraction, plant extracts can contain an enormous variety of active molecules, such as phenolic compounds, essential oils, alkaloids, flavonoids, tannins, saponins, terpenoids, etc. which are already established in the plant extracts having medicinal values and are environmentally benign, yet chemically complex structures. These active molecules are often degraded in the processing steps and offer poor bioavailability. To overcome these problems, nanotechnology is gaining attention among researchers. Currently, nanotechnology in food production is focusing on the development of nano-sized food ingredients and additives, delivery systems for bioactive compounds and innovative food packaging. New food products containing nanostructures formed with plant extract are being currently developed for different purposes: (i) to protect nutraceuticals and therapeutics against degradation during manufacturing, distribution and storage, improving their stability (ii) to enhance the bioavailability of poorly soluble functional food ingredients (e.g. hydrophobic vitamins), thus improving their nutritional value, (iii) to increase food shelf-life by protecting it from oxygen and water, (iv) to produce low fat, low carbohydrate or low calorie products (e.g. mayonnaise, spreads and ice creams), (v) to optimize and modify the sensory characteristics of food products creating new consumer sensations (e.g. texture, consistency, development of new taste or taste masking, flavor enhancement, color alteration), and (vi) to control functional food ingredient delivery (e.g. flavor, nutrient).

Keywords: *plant extract, rational usage, food nanotechnology*

WATER QUALITY AND FOOD SAFETY

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Abstract

Throughout the history, humans have preferred areas where the water can be obtained most easily for settlement places. Water is one of the most important substances for life. About 63 to 70% of a person's body weight is water. It is vitally important that the water rate in the body is maintained at an adequate level. Water is the most important part of nutrition. Each function of our body is provided with water and losing 10 percent of water in the body causes very serious discomforts. In addition to being a beverage, water is one of the most important factors in providing food safety. If there is no water security, there is no food safety. When water is connected with health-related issues, drinking water with usage water should be considered. Water quality depends on technical and hygienic quality of the water source. Water quality depends on the necessary sensitivity at every stage from source of water to distribution of water. Wateressential for life must be provided from clean sources. Nowadays, water quality is negatively affected as a result of rapidly population growth, urbanization and industrialization as well as the impact of domestic, industrial and agricultural pollutants. It is estimated that approximately 80% of all diseases are caused by inadequate water quality and cleaning conditions in the developing world. Every year, millions of peoplemore than half children, lose their lives due to water pollution. For this reason, water quality is very important in terms of food safety.

Key words: *water, water quality, hygiene, food safety.*

INVESTIGATION OF INHIBITION KINETICS OF SOME HEAVY METALS ON GLUCOSE-6-PHOSPHATE DEHYDROGENASE ENZYME FROM TURBOT GILL TISSUE

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Abstract

Glucose-6-phosphate dehydrogenase (G6PD) catalyzes the first and rate-limiting reaction of pentose phosphate pathway producing NADPH, involved in the transformation of glucose into ribose, which is necessary for various biosynthetic reactions. Erythrocytes use pentose phosphate pathway in the production of NADPH; and in case of G6PD deficiency, NADPH levels significantly decreases. Thus, inhibition of G6PD activity may cause several deficiencies within the body. In this study, G6PD enzyme of Turbot (*Psetta maxima*) gill tissue was partially purified and effects of some heavy metals on enzyme activity were examined. The homogenate of turbot gill was initially prepared for the purification of the total G6PD enzyme from the extract. Ammonium sulfate precipitation and dialysis steps were performed. Enzyme activity was measured spectrophotometrically at 340 nm. Optimum values of ionic strength, pH and substrate concentrations for turbot gill G6PD were examined. Inhibitory effects of some common heavy metals, namely Ag^{+1}, Cr^{+3}, Ba^{+2}, and Zn^{+2}on the enzyme were also investigated. Each of the heavy metals showed inhibitory effect on enzyme activity. I_{50} values of tested heavy metals were determined as 0.03 mM, 2.5 mM, 0.97 mM, and 0.8 mM, respectively.

Keywords: *Glucose-6-phosphate dehydrogenase, inhibitor, heavy metal, turbot.*

DETERMINATION OF SOME PHYSICAL PROPERTIES OF OSMANCIK-97 AND TOSYA GUNESI RICE SEED VARIETIES

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Abstract

In this study, some physical properties of Osmancik-97 and Tosya Gunesi rice seed varieties were determined. The values of gravimetric properties (geometric mean diameter, surface area and sphericity), volumetric properties (bulk and true densities), mechanical properties (static friction coefficient and rupture force) of Osmancik-97 and Tosya Gunesirice seed varieties were determined. The geometric mean diameter values were found as 3.94 mm and 3.84 mm for Osmancik-97 and Tosya Gunesi rice varieties, respectively. The sphericity and surface area values were 44.96% and 48.93 mm^2 for Osmancik-97, whereas the sphericity and surface area values were 45.28% and 46.43 mm^2 for Tosya Gunesi rice variety. The volumetric properties values such as bulk density and true density for Osmancik-97 were found as 675.00 kg/m^3 and 1029.04 kg/m^3, whereas, the bulk and true densities were found as 687.13 kg/m^3 and 1116.67 kg/m^3 for Tosya Gunesi rice variety. The mechanical properties such as the static friction coefficient values of Osmancik-97 variety were found as 0.4100, 0.2339, 0.3130 for rubber, glass and galvanized steel friction surfaces, respectively, whereas the static friction coefficient values for rubber, glass and galvanized steel friction surfaces were found as 0.5395, 0.2101, 0.4144 for Tosya Gunesi rice variety, respectively. The rupture force values along X-, Y-, Z- compression axes were as 19.08 N, 36.06 N and 148.9 N for Osmancik-97, respectively,whereas the rupture force values along X-, Y-, Z compression axes were as 9.70 N, 25.75 N and 64.67 N for Tosya Gunesi rice varietyat 80 mm/min compression speed, respectively. The measured physical properties for Osmancik-97 and Tosya Gunesi rice varieties will serve to design and improve the relevant machines and systems used in harvest and postharvest treatments.

Keywords: *Rice variety, physical properties.*

THE EFFECT OF AVG TREATMENT AND HARVEST PERIODS ON PHYSICAL, CHEMICAL AND MECHANICAL PROPERTIES OF PLUM (CV. GIANT) FRUITS

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Abstract

The effect of AVG (Aminoethoxyvinylglycine) treatment and harvest periods on physical, chemical and mechanical properties of plum (cv. Giant) fruits was determined. The geometric mean diameter was lower on 13 August than the other 20 August harvest changes. The surface area and volume of plum fruits was higher in 13 August than 20 August harvest periods. *L**, *a** and *h* colour characteristics decreased with harvesting time, *b** and *C** values increased with harvesting time changes, whereas, plum fruits skin *L**, *a** and *h* colour characteristics decreased with harvesting time for 200 mg L^{-1} AVG treatment, respectively. In general, the friction coefficients for galvanized steel, laminate, plywood and chipboard friction surfaces increased with harvesting time of plum fruits. SSC, pH and TA chemical characteristics values of plum fruits changed from 12.17 to 10.80 (11.26% decrease); from 3.54 to 3.64 ((2.82% increase); from 1.441 to 1.146 (20.48% decrease) for 13 August harvesting period with AVG dose increase from 0 mg L^{-1} to 200 mg L^{-1}, respectively. Generally, the rupture force, deformation and absorbed energy of plum fruits decreased by AVG treatments and harvesting time along X-, Y-, and Z- three axial axis for compression tests. For this reason, post-harvest technological applications of the plum fruits must be designed while taking these criteria into consideration such as physical, mechanical and chemical properties of plum fruits.

Keywords: *Aminoethoxyvinylglycine, geometric mean diameter, colour, rupture force*

PHYSICO-MECHANICAL, COLOUR AND CHEMICAL PROPERTIES OF SELECTED CHERRY LAUREL GENOTYPES OF TURKEY

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Abstract

The physico-mechanical, colour and chemical properties of three cherry laurel genotypes (54 K 01, 55 K 07, 61 K 04) cultivated in Turkey were evaluated. The geometric properties such as geometric mean diameter and sphericity were found in the range of 13.3 to 17.4 for fruit, 8.3 to 9.0 mm for fruits pit and 6.1 to 6.9 mm for kernel of cherry laurel 54 K 01, 55 K 07, 61 K 04 genotypes, respectively. 54 K 01 cherry laurel genotype had the highest volumetric properties such as bulk density, true density for fruits, whereas, 55 K 07 cherry laurel genotype for fruits pit had the lowest values among these three cherry laurel genotypes for these properties. 54 K 01 cherry laurel genotype had the highest colour values for L*, a*, b* characteristics of fruits as 24.1, 16.2, 2.4 respectively and its pit as 40.8, 11.2, 14.3 among three cherry laurel genotypes, whereas, 51 K 01 had the lowest L*, a*, b* values for kernel of cherry laurel fruits as 42.0, 7.7 and 12.9, respectively. The fruit removal force ranged from 0.38 to 0.59 N, whereas, the puncture force for X-, Y-, Z- axes ranged from 0.39 to 0.75 N; 0.37 to 0.65 N, 0.39 to 0.55 N, among three cherry laurel genotypes, respectively. The static friction coefficient of cherry laurel fruit, its pit and kernels changed from 0.29 to 0.72 (fruit), 0.41 to 0.93 (pit), from 0.34 to 0.60 (kernel). The coefficient of friction of cherry laurel fruit, its pit and kernels were largely influenced by the friction surfaces studied. It is important to determine physico-mechanical, colour and chemical properties of particular fruit, its pit and kernels for selected Cherry laurel genotypes which may increase fruit quality, economic value for harvest and post-harvest technologies. Therefore, these properties should be considered.

Keywords: *Cherry laurel, surface area, fruit removal force, static friction coefficient, solid soluble content.*

ANTIOXIDANT STABILITY OF CINNAMON, CLOVE, AND HIBISCUS INFUSIONS AND DECOCTIONS STORED IN THE REFRIGERATOR

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Abstract

In this study, the antioxidant stability of cinnamon, clove and hibiscus infusions (95°C, 5 and 10 min) and decoctions (100°C, 5 and 10 min) were determined under refrigerator storage conditions for 12 days and their total phenolic content (TPC), free radical scavenging activity (FRSA), and iron chelating activity (ICA) were determined. Generally sharp decreases were observed varying from 33% to 85% in infusion process especially for 10-minute extraction produced plant extracts with higher TPC stabilities than decoction process. Unlikely to TPC stabilities, FRSA stabilities of infusions and decoctions were mostly maintained or significantly increased during the storage. The highest FRSA stabilities or increments were determined for clove infusions and decoctions around 2-fold and followed by hibiscus infusions and decoctions from 18to 33%. All decoctions had significantly higher FRSA after storage while infusions had changeable values. As the extraction time was increased FRSA stabilities of clove infusions and decoctions were affected positively whereas FRSA stabilities of cinnamon and hibiscus infusions and decoctions were affected negatively. During storage ICAs of infusions and decoctions were mostly increased where clove extracts had higher ICAs than cinnamons independently from the extraction conditions. However, the increments in ICAs during storage were quite high (4.5 fold for 5-min clove decoction, 3-fold for 5 min cinnamon or clove infusions) the values were not enough to satisfy the expectations. This study revealed that high antioxidant stability of plant aqueous extracts was suitable as natural antioxidant sources for functional food production.

Keywords: *cinnamon, clove, hibiscus, infusions and decoctions, antioxidant stability.*

Acknowledgment

This study was supported by Adana Science and Technology University Scientific Research Coordination Unit. Project Number 17103012.

DETERMINATION OF ROOT-KNOT NEMATODES AND SOIL-BORNE PATHOGENS IN GREENHAUSE IN SERIK (ANTALYA, TURKEY) AND EVALUATION OF EFFECTIVE NEMATODE CONTROL METHOD

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Abstract

This study was carried out in Serik, Antalya, Turkey and it was aimed to determine root-knot nematodes and soil-borne pathogens and to evaluate the effective nematode control methods. Soil and root samples from 29 greenhouses were taken in January and June 2016 and the nematode control methods were followed in these greenhouses. Root-knot nematodes were found in 22 samples, while were not found in 7 samples. As a result of morphological and molecular diagnosis, 18 samples were identified as *Meloidogyne incognita* and 4 samples as *M. javanica. Alternaria spp., Phytium spp., Rhizoctonia spp., Verticillium spp., Botrytis spp., Macrophoma spp., Fusarium oxyporium lycopersici*, *Fusarium solani* and *Conidiobulus* spp. were found on roots. More than one soil-borne pathogen was detected in the samples which had high gal index. It was observed that most of the farmers were doing solarization and it was seen as a successful nematode control method. Only 8 farmers using solarization (S), nematicide (N) and nematode resistance variety (RN) were determined. However, it seems that 3 nematode control methods application increased the cost of combat. High efficacy results have been obtained in S + RN or S + N or S + N + RN applications. Combined applications (S + RN, S + N, S + N + RN) had a high effect to control root-knot nematode. The two farmers used only as RN, but did not seem to provide effective protection. It is necessary to investigate the timing of planting, or the virulence of the population in the greenhouses. Root knot nematodes did not seem to be effectively suppressed in the greenhouses where only nematicides were applied. This could be due to the fact that the nematode control method was notdone at the right time, or an effective dose adjustment and soil application was not done properly.

Keywords: *Meloidogyne, pathogen, solarization, resistance variety, nematicide, Fusarium spp.*

COLD CHAIN FOR QUALITY AND SAFETY

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Abstract

Food safety is necessary and also a very critical issue for consumers. The safety and quality measures are taken by the Hazard Analysis and Critical Control Point (HACCP) plan, which is an important element in the control of safety and quality in food production and trade in food. The HACCP system can be used at all stages of a food chain, from food production and preparation processes including packaging, storage, transport, distribution, etc.. Additionally, legislation and good manufacturing practices (GMP) within the cold chain are designed to ensure effective control of safety and quality. The target of food safety is to preserve the safety and quality of refrigerated foods. Cold chain is a temperature-controlled supply chain used to describe the series of interdependent operations for chilled and frozen foods. The cold chain extends from the raw material supplier to the consumers' refrigerator or freezer. Safety and quality of chilled and frozen foods is related to cold chain conditions during production, distribution, storage and retailing. A poorly controlled step can result in the loss of a product or a product that becomes toxic. The objective of this study is to present information about cold chain and its importance for food safety.

Keywords: *Food safety, cold chain, HACCP, GMP.*

INVESTIGATION ON NATURAL INFECTIONS OF PERIWINKLE (*CATHARANTUS ROSEUS*) BY VIRUSES AND PHYTOPLASMAS IN TURKEY

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Abstract

Periwinkle (*Catharantus roseus*) is one of the most used ornamental plants in landscaping areas in Turkey. Different symptoms were observed on periwinkle plants such as mosaics, spots or line patterns, reduction of leaves and flowers in size, deformations of leaves and flowers, color-breaking of flowers, severe chlorosis, stunting, virescence and phyllody. Stem blight, leaf spots and damping-off and root rot of seedlings caused by fungal agents were also observed on plants. Samples (15) collected from symptomatic plants from landscaping areas in Adana, Antalya, Hatay and İstanbul were tested for presence of some insect-transmissible viruses (*Alfalfa mosaic virus*: AMV, *Cucumber mosaic virus*: CMV, *Potato virus Y*: PVY and *Tomato spotted wilt virus*: TSWV) by DAS-ELISA, and for phytoplasmas by PCR. Samples were mechanically inoculated into test plants, periwinkle and *Nicotiana tabaccum*. Insect transmission trials were also attempted by using *Myzus persicae*. Shoots of some suspected plants were also grafted on healthy periwinkle plants. Phytoplasma isolates from periwinkle plants were sequenced and classified in the 16SrIX group, related to the '*Candidatus* P. phoenicium' species. One of the isolates was also transmitted by *Cuscuta campestris* from infected plant to healthy periwinkle. Phytoplasma diseases of periwinkle were also risk factor for fruit and other crop production. Detection of periwinkle diseases was important for the epidemiology and the management of insect-transmissible diseases in ornamental plants and other potential hosts in Turkey. To our knowledge, this is the first report of single CMV (3), TSWV(1) and mixed CMV+PVY(2) infections and '*Candidatus* P. phoenicium' infection (3) in *Catharantus roseus* in Turkey.

Keywords: *Aphid, CMV, Cuscuta, Myzus persicae, vector, PVY, TSWV, virus, phytoplasma*

INVESTIGATION ON VIRUS DISEASES IN PARSLEY (*PETROSELINUM CRISPUM*) FIELDS OF HATAY PROVINCE OF TURKEY

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Abstract

Parsley production is about 23 000 tons in Hatay in 2016 which is the main parsley production area of Turkey (40%). There is a lack of information about virus diseases of *parsley* in Hatay as well as in Turkey in general. Different symptoms such as stunting, leaf distortion, discolouration, crinkling, vein clearing, necrosis or necrotic spots on leaves, bright yellow blotchs or severe mosaic patterns on the leaves, thickening of the interveinal tissue, are commonly observed for many years in Hatay. In recent years, leaf chlorosis and/or reddening of whole plant symptoms related to "red leaf disease" have also been observed in parsley growing areas. Leaf samples were collected from the main parley production areas in Hatay, and tested for presence of *Alfalfa mosaic virüs* (AMV), *Cucumber mosaic virus* (CMV), *Potato virus Y* (PVY) and *Tomato spotted wilt virus* (TSWV) by DAS-ELISA. The samples collected from suspected plants were found to be infected with AMV and CMV by the rate of 4/96 and 26/96, respectively. PVY and TSWV infections were not detected in the tested samples. *Orobanche ramosa* was intensively observed on parsley plants in fields in Arsuz and Samandağ. *Myzus persiceae* colonies were commonly observed on younger parts of plants during spring and autm periods. Thrips and leafhopper damages on parsley plants were also inspected in the fields. Detailed investigations should be carried out in other viral and phytoplasma diseseas of parsley in Turkey. This is the first report of AMV infection in parsley inTurkey and CMV in parsley in Hatay.

Keywords: *AMV, aphid, CMV, Myzus persiceae, parsley, PVY, TSWV, virus.*

INVESTIGATION ON VIRUSES OF SMALL HOT PEPPERS (CAPSICUM ANNUUM) IN HATAY-TURKEY

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Abstract

Small hot pepper (Capsicum annuum) plants with fruits in different colors and shapes are commercially produced in Hatay province of Turkey. There is lack of information about the status of viruses causing diseases in these pepper types. Stunting, discoloration and deformation, mosaic, ring spot, line pattern on leaves and fruits, reduced leaf size, curling upward of leaves, necrosis or general chlorosis or yellowing symptoms have been mostly observed on plants in main pepper growing areas in Antakya, Arsuz and Samandağ districts of Hatay-Turkey. A total of 200 young plant samples taken from suspected hot pepper plants grown in field and greenhouse conditions and weeds were investigated by sap inoculation and DAS-ELISA methodsfor presence of main pepper viruses in Hatay in 2015-2016. *Potato virus Y*-PVY (128) was determined as the most common virus in small hot peppers in Hatay. *Alfalfa mosaic virus*-AMV (2), *Cucumber mosaic virus*-CMV (42), *Potato X virus*-PVX (3), *Potato leafroll virus*-PLRV (5), *Tobacco etch virus*-TEV (4) and *Tomato spotted wilt virus*-TSWV (2) were identified in small hot pepper plants. Mixed infections of these viruses were also identified in pepper plants with low rates. Some plants were found to be infested by parasitic plants, *Cuscuta campestris* and Orobanche ramosa in a few pepper fields. Dodder plants could play a role in the transmission of viruses to other plants in pepper growing areas. *Physalis angulata*, *Mercurialis annua* and *Solanum nigrum* samples were found to be infected with CMV and PVY.

Keywords: *Cuscuta campestris*, *ELISA*, *greenhouse*, *hot pepper*, *ornamental*, Orobanche ramose, *virus*, *weed.*

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INVESTIGATION OF VIRUS, PHYTOPLASMA AND SPIROPLASMA DISEASES IN SESAME (*SESAMUM INDICUM*) FROM HATAY-TURKEY

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Abstract

Sesame yellows (*Spiroplasma citri*) and sesame phyllody (phytoplasma) diseases have been recorded on sesame (*Sesamum indicum*) in Turkey for a long time. Spiroplasma and phytoplasma diseases may cause crop loss in sesame production in Turkey. There is a lack of information about virus infections on sesame in Turkey. Mainly yellowing, virescence, phyllody, floral sterility and proliferation, cracking of capsules, germination of seeds in capsules, and formation of dark exudates, rolling of leaves inward, mosaics and wilting symptoms were observed on sesame plants in fields. Samples from susceptible sesame plants were tested for presence of some viruses (*Alfalfa mosaic virus*: AMV, *Cucumber mosaic virus*: CMV, *Potato virus Y*: PVY and *Tomato spotted wilt virus*: TSWV) and *Spiroplasma citri* by DAS-ELISA and for phytoplasmas by PCR and DAPI, and transmission trials by a known vector *Circulifer haematoceps*. TSWV were found in plants showing chlorosis or necrosis (12/64). The incidence of *Bemisia tabaci*, *Empoasca* spp. and *Thrips tabaci* populations were observed to be high in fields. Colonies of *Myzus persicae* were observed on a few plants. *S. citri* were detected in the samples collected from districts where there is no citrus production (3/64). Results of DAPI assays were supported by PCR to presence of phytoplasmas in suspected plants. Phytoplasma isolates from sesame were sequenced and classified in pigeon pea witches'-broom (16SrIX) group. The agents of both “sesame phyllody” and “sesame yellows” diseases could be transmitted by *C. haematoceps* from sesame to healthy *Catharanthus roseus* test plants. This work represents the first report of TSWV detected in sesame in Turkey.

Keywords: *Circulifer haematoceps, phytoplasma, phyllody, sesame yellows, Spiroplasma citri, TSWV.*

A GENETICALLY MODIFIED ORGANISM (GMO) REGULATIONS IN TURKEY

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Abstract

Turkey has passed/signed certain biosafety related legislations as a result of richness of endemic species, increased research and commercial activities in biotechnology, Cartagena Protocol on September 11, 2003 and commencement of membership negotiations with European Union (EU) on October 3, 2005. With the aim of ensuring the protection of the environment and biodiversity against the potential risks stemming from genetically modified organisms (GMOs), the Cartagena Protocol on Biosafety, the first international document of a binding nature in this regard, entered into force in Turkey on January 24, 2004. After these activities, Turkey has established a biosafety law paralleled to Cartagena Biosafety Protocol and EU directives by noticing necessities of the country about GMO issue. Biosafety Law and its relevant regulations entered into force on September 26, 2010.There are no restrictions in Turkish legislation on trade of GMOs and products thereof and the foreign trade is regulated in the framework of our rights arising from the World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary (SPS) Measures, by taking into consideration public health. In accordance with the mentioned Law, for the importation of GMOs and products thereof, the applications shall be made to Ministry of Food, Agriculture and Livestock and the mentioned applications shall be forwarded to the Biosafety Board for the evaluation of applications which have been submitted. To date, 7 types of GM soybean and 25 types of GM maize were approved as feed for import.

Keywords: *GMO, Biosafety, Regulations, Turkey.*

DETERMINATION OF THE BASIC CHARACTERISTICS OF CORN AND WHEAT FLAKES WITH CAROB

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Abstract

New product development is one of the topics that the food industry stands for. Carob is a functional food ingredient that comprises very low fat content although it is rich in terms of vitamins, minerals and dietary fiber content. In this study, a new product made with only basic flake components was produced without the use of chemical additives in the production of corn and wheat flake, taking into account the tendency of consumers to prefer products that do not contain additives, which have increased in parallel with consumer awareness in recent years. For this purpose, flakes were produced in different proportions according to 24 different formulations using corn semolina (50%–90%), wheat semolina (5%–50%) and carob flour (0%–25%). Chemical, physicochemical and sensory properties of flakes were determined. It has been determined that the flake produced having composition of 85% corn semolina and 15% carob flour was the highest qualities. It has been identified that the mentioned sample contained 6.41%±0.05% moisture, 1.51%±0.02% ash, 2.33%±0.11% protein, 0.54%±0.05% fat, and 14.68%±0.56% total dietary fiber and had 6.34±0.1 pH value, 5.81±0.66 free fatty acid amount in terms of oleic acid, 25.5±2 kcal/100 g energy value, 5.21±0.01 g gel/g water solubility index, and 29.22%±0.84% water retention index. As a result, a new product has been developed by incorporating carob, which is high nutritive properties and natural product, into the cornflake formula. Thus, the use of carob in the production of cornflakes has been made possible except for the purpose of molasses.

Keywords: *Cereal flake, Carob, Corn semolina, Wheat semolina, New product.*

EFFECT OF SOME OF ENTOMOLOGICAL FACTORS ON WHEAT QUALITY IN FIELD CONDITIONS IN TURKEY

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Abstract

Wheat, (*Triticum aestivum* L.), one of the most common produced crops, has advantages of being raised indifferent to climatic and geographical ecosystems owing to its adaptation ability. It is the most important nutrient for human beings, constitutes approximately 20% of the calories obtained from the food all over the world. Wheat takes the first place in field crops in Turkey with the 7,820,750 ha growing area and 19,000,000 ton annual production. There are lots of important entomological factors affecting wheat quality in Turkey. Most important of them are *Eurygaster integriceps* Put. and *Aelia rostrata* Boh. Wheat is damaged by these bugs, and that damage has produced important economic losses to millers and bakers. They caused direct yield reduction. Yield losses were estimated by 50 to 90% in wheat and 20 to 30% in barley. Besides, they inject digestive enzymes during feeding which reduce the baking quality of the flour. If as little as 2 to 3% of the grain has been fed on, the entire grain lot may be rendered unacceptable for baking purposes because of poor-quality flour. Some other important entomological factors include *Zabrus* spp., *Anisoplia* spp., *Pachytychius hordei* Brulle. *Zabrus* adults become harmful by gnawing full immature grains in recent harvesting days. The grain of wheat eroded by Bambul's adults cannot be used as seeds and for bread making. Because of the feeding of *P. hordei* adult, the number of grains and the weight decrease at the very beginning. But the main loss is caused by larvae of insects. The objective of the work was to examine some of entomological factors on wheat quality in field conditions in Turkey.

Keywords: *Wheat, Entomological factors, Wheat quality, Turkey.*

EFFECT OF SOME OF ENTOMOLOGICAL FACTORS ON WHEAT QUALITY IN STORE CONDITIONS IN TURKEY

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Abstract

Wheat, *Triticum aestivum* L. (Poaceae) is grown on about 8 million ha area annually with the production of approximately 20 million tons in Turkey. Wheat is an important basic food consumed mostly as bread in the country. It is also used to make various processed baking products in the food industry. It provides a substantial component of the human diet; wheat products provide 53 and 66% of the per capita dietary supply of calories and protein, respectively. Wheat losses could occur during harvest, storage, processing and its consumption. Among these, storage stage losses have an important place at countries especially those without modern storage conditions. There are a lot of important entomological factors affecting wheat quality and quantity in store condition. Most important of them are *Trogoderma granariu* Evert., *Oryzaephilus surinamensis* L., *Tribolium castaneum* Hbst., *Tribolium confusum* Duv., *Tribolium confusum* Duv., *Gnathocerus cornutus* Fabr., *Tenebriodes mauritanicus* L. and *Leomophloeus ferruginneus* Steph. These insects cause significant economic losses; reduce 5-10% weight of wheat and decrease in the bread making quality. Insects cause the wheat quality to decline due to product contamination with filthy nets, scraps and feces that they secrete. Mold, stinks and redness may occur due to insect activity in the product. In the case of consumption of dirty products, they are the source of the inconveniences that can negatively affect human health as especially allergic incidents. The objective of the work was to examine some of entomological factors on wheat quality in store conditions in Turkey.

Keywords: *Wheat quality, Insect, Stored product, Economic losses, Turkey.*

THE EFFECTS OF INULIN ADDITION ON PHYSICAL AND TEXTURAL PROPERTIES OF GLUTEN FREE COOKIES

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Abstract

Celiac is an important autoimmune disease due to gluten intake in genetically predisposed persons. The treatment of the disease is possible by the consumption of gluten-free products. During last years, there has been a growing interest to enhance the variety and quality of the gluten-free products for these patients. In this study, the aim was to determine the impact of inulin on physical and textural quality of gluten-free cookie (GFC). Because of inulin is considered to be dietetic fiber and also used as food additive. Gluten-free formula was prepared by mixing 53.15% rice flour, 24.53% chickpea flour, 12.32% potato starch, 5% corn flour and 5% corn starch. Inulin was added at 0 (control), 5, 10 and 15% w/w levels into this formula by the displacement with rice flour. The spread ratio of the GFC was increased (from 4.74 to 7.50) while thickness was decreased (from 14.20 to 9.45 mm) as the level of inulin increased. Addition of inulin to GFC did not cause significant differences on lightness, yellowness and redness values whereas significant reduce was observed on hardness (from 735.7 to 701.8 g) and fracture ability (from 11.1 to 8.1 mm) of GFC. Lower hardness and fracture ability values of cookies produced with increasing level of inulin (more than 5%) may be cause to reduce at their eating quality. As a result, substitution at 5% inulin into GFC gave parameter values at least as good as the control sample and produces acceptable cookie, in terms of physical and textural properties.

Keywords: *Celiac, Cookie, Firmness, Gluten free, Inulin.*

AN IMPORTANT PHENOMENON IN THE PRODUCTION OF WHEAT FLOUR: BLEACHING

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Abstract

The color of wheat flour is determined by the genetic characteristics of wheat and processing steps applied during wheat flour production. One of the most important issues raised in flour exports is that flour has a completely white color, so ash amount and pike level of flour should be low. Color is very important for determination of quality and parity of flour. Basic processes applied during wheat flour processing are: warehousing of wheat, blending, cleaning, tempering, milling and flour packaging. The newly milled flour has a yellowish color due to carotenoids in the endosperm. After 4-6 weeks storage period, color of the resulting flour, which oxidizes the carotenoids under the influence of atmospheric oxygen, is naturally greyish and whitish. However, this method does not find much application in practice. According to the Turkish Flour Federation Industrialists 2012 data, about 700 flour factories operating in Turkey do not have enough space to naturally bleach the flour and 1 month rest period of flour is regarded as an economic loss in terms of flour factories. With the use of some chemical substances, flour can be bleached without resting. Nitrogen peroxide (N_2O_4=gas), nitrogen trichloride (NCl_3=gas), chlorine+nitroxychloride (Cl+NOCl=gas) and benzoyl peroxide ($C_{14}H_{14}O_4$=solid) are used for this purpose. However, the interest in natural products where chemical additives are not used is increasing day by day. Since wheat flour is a basic component used in the production of many bakery products and determining the products quality, bleaching it with natural processes is an important phenomenon.

Keywords: *Wheat, Wheat flour, Bleaching, Flour color.*

PATHOLOGICAL EXAMINATION OF NECROTIC STAINS ON GOLDEN APPLE FRUITS DURING HARVESTING

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Abstract

In this study, the striking necrosis stains detected in the sour golden apple fruits which were harvested at the beginning of October were examined from a pathological point of view. In a weekend market of Diyarbakır province center in Turkey, after detected symptomatic signs of unknown agents on important amount of apple fruits, samples were taken and brought to the laboratory. Necrotic stains generally appear to concentrate near the flower parts of the fruit in an uneven circular or ellipsoidal form. It was also determined that the individual stains reached a diameter of 7 mm, while the combined stains reached a diameter of more than 1 cm. No active fungal structures were identified in microscopic examinations. In sterile conditions, 3-4 mm^2 sections were taken from the necrotic tissues containing the healthy part, and the cells were transplanted to the PDA medium and subjected to darkness incubation for 2 weeks at 23°C, but no active fungal and bacterial colonies or structures developed. Apple fruits were subjected to incubation at 10°C, 15°C, and 20°C for 3 months in the dark conditions and there was no infective progression from necrosis according to the observations made here. However, some necrosis, which is less obvious in the crustal texture, became more prominent over time. As a result, it has been concluded that the necrosis that appears as striking signs before or after harvesting in fruity golden apples might be come from a physiological basis of abiotic origin. Studies in the laboratory culture support this. The present symptoms are quite similar to the necrosis caused by Ca deficiency in the literature. However, the exact diagnosis occurs after analysis of nutrition elements.

Key words: *apple fruit, necrotic spots, diagnosis, disease agents.*

COMPARISON OF SOME MORPHOLOGICAL CHARACTERS OF APPLE SCAB IN TWO DIFFERENT AGRICULTURAL ECOLOGIES OF TURKEY

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Abstract

In this study, some morphological and physiological characteristics of apple scab, *Venturia inaequalis* [(Cooke) G.Winter 1875] isolates belonging to Bingol and Isparta, which are considered to be two extremes of apple production in Turkey were measured and compared. Colony colours and boundary lines, mycelial tissue structures, colony growth rates, conidial numbers and sizes were investigated characters and conducted under controlled conditions, with using different media. Comparisons were made between a minimum of 9 and a maximum of 27 sherry isolates from each district depending on the nature of the study. Significantly different results were obtained in Bingöl and Isparta isolates, which have very important privileges in terms of apple breeding and controlling and which are 1127 km away from one another. After 12 days of incubation at PDA and MEA, the colonies of Isparta isolates grew in a slightly greyer, more adherent and tightly micelle-like form in their feed. Again, the colony margins were sharper and more pronounced, with soft protrusions occurring somewhere, resulting in impaired straightness. In PDA, MEA and CMA, after 12 days of incubation, the colonies showed an average improvement of 30% faster in Bingöl isolates compared to Isparta isolates and made a statistically significant difference. In the $1cm^2$ volume of the PDA, after 72 hours of incubation, Bingöl isolates produced an average of 35.8 conidia, while Isparta isolates produced an average of 30.7 conidia. This was statistically significant as compared to the test. After 48 hours incubation in the PDA, the width and height averages of per 9 conidia were measured close to one, and statistically not significant. As a result, it is thought that the privileges of the isolates of apple scab belonging to two districts may be due to phenotypic characteristics which may be caused by agricultural differences on racial level.

Key words: *Apple scab, agricultural ecologies, morphological structures.*

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DETERMINATION OF THE ACTIVE PROCESSES OF THE ROSEMARY POWDERY MILDEW DURING THE PLANT DEVELOPMENT PERIOD IN ŞANLIURFA PROVINCE IN TURKEY

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Abstract

In this study, the time periods in which the agent of powdery mildew (*Golovinomyces biocellatus*) detected in the rosemary (*Rosmarinus officinalis*) plant growing in Şanlıurfa province is effective in the plant development period has been determined. For this purpose, surveys were carried out at different times of the year, and the months in which the visual symptoms found of powdery mildew were determined. Later, during these months, samples were taken from specific areas at intervals of 15 days to determine the conidial intensities of the agent. Visual and microscopic examinations of the two-year sampling area showed that the symptoms of the pathogen occurred in the visible range between February 15 and March 15, as well as microscopic measurements up to the beginning of February and April. No visual and microscopic findings were found outside of these two-year determinations. Between 1 February and 1 April, the intensities in 1 ml of a single leaf conidia from diseased specimens of 15 days intervals were estimated as 12.5, 137, 139, 121, and 7.5 according to the two year average. As a result, in the climatic conditions of Şanlıurfa, it was observed that rosemary powdery mildew could be found within short time periods during the year. It was determined that the symptoms of the disease were found on the limited shoots and leaves of the inner and lower parts of the plant cluster. It was also observed that the specimens were often grown on the upper surfaces of the leaves. According to these results, it could be concluded that rosemary powdery mildew in Şanlıurfa region would not pose a risk for open field cultivated plants, but would form a certain risk for plants grown in closed areas.

Key words: *Rosmarinus, powdery mildev, active periods.*

BOTANIC ORIGIN AND ANTIOXIDANT ACTIVITYOF POLLEN FROM SİVAS AND MUŞ (TURKEY)

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Abstract

Pollen is a male gametophyte of seed plants. Pollens which collected from different flowers by honeybees' colonies (*Apis mellifera* L.) for the purpose of brood breeding and larva feeding are among these remedies. Pollen has been used since ancient times for the nutrition and treatment of diseases. Pollen consists of protein, carbohydrates, lipids and other elements (phenol, flavonoid, enzymes. etc.). Although, pollens' chemical composition had distinguishably differences depending on the species of plants visited by bees and also other external factors, including seasonal and environmental factors. The aim of this study was to determine the botanic origin and antioxidant effects of honeybee pollens collected Sivas and Muş, Turkey. Pollen analysis, antioxidant activities, total phenol-flavonoid contents of pollen samples from Sivas and Muş cities were studied based on the international literatures. According to pollen analysis, Asteraceae-*Tanacetum* type and *Rosa canina* are common in Sivas, whereas *Centaurea* sp. and *Onobrychis*sp are dominant in Muş. The antioxidant capacity of pollen extracts was assessed through the hydrogen peroxide scavenging activity (in terms of SC_{50}), ferric reducing antioxidant power capacity (FRAP), DPPH radical scavenging activity (in terms of SC_{50}), metal-chelating activity (%), total phenol content (TPC), and total flavonoid content (TFC). Their values were found as 26.31-26.84µg/mL, 71.78-72.76%, 52.75-52.9 µg/mL 49.67-68.82%, 1178.19-2663.78 mgGAE/100g and 69.44-89.87 mgCAE/100g, respectively. For comparison of these results, butylatedhydroxylanisole (BHA), butylatedhydroxyl toluene (BHT) and α-tocopherol (TOC) were used as standard antioxidant compounds. The investigated activities of samples could be related with their pollen composition. The obtained results indicate that the investigated pollens are an important source in terms of antioxidant properties that could be beneficial for human health.

Keywords: *antioxidant activity, botanic origin, pollen, total flavonoid, total phenol.*

IN VITRO INHIBITION OF BACTERIAL SPECK OF TOMATO *PSEUDOMONAS SYRINGAE* PV. *TOMATO* BY SOIL - BORNE ANTAGONISTIC BACTERIA IN TURKEY

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Abstract

Bacterial speck of tomato (*Pseudomonas syringae* pv. *tomato*) is a significant source of economic loss in the tomato industry. This disease is cosmopolitan in distribution, favoured by low to mild temperatures and high moisture conditions. Lesion on fruit are very small (almost pinpoint-like) spots and do not penetrate very deeply into the tissue. The spots can be raised, flat or sunken, and range in color from brown to black. Lesions may make fruit unfit for fresh market. Control of bacterial speck of tomato is possible using resistant cultivars, disease-free seed and transplants and/or by treatment with copper compounds. Nevertheless, using bacteria as biological control agents are still misused. However, the biocontrol of disease affecting several crops by this microorganism have been increasingly researched. The objective of this experiment was to evaluate *in vitro* biocontrol of bacterial speck of tomato by using the candidate antagonist bacteria. The study consisted of two parts: isolation and multiplication of the potential antagonists; *in vitro* screening of potential antagonists against *Pseudomonas syringae* pv. *tomato.* Totally one hundred and twenty- four candidate antagonist bacteria were obtained from rhizosphere of healthy tomato plants and some other fruit trees. The effect of candidate antagonist bacteria over phytopathogen *Pseudomonas syringae* pv. *tomato* was performed by the antagonistic activity measured by inhibition zone diameter. In vitro studies showed that dual cultures of all organisms significantly decrease the growth of *Pseudomonas syringae* pv. *tomato.* Interestingly, among 17 effective antagonist bacteria, three of them totally inhibited the growing ability of pathogen *Pseudomonas syringae* pv. *tomato.*

Keywords: *Tomato, Pseudomonas syringaepv.tomato, antagonist bacteria, soil-borne.*

BACTERIAL SPOT (XANTHOMONAS AXONOPODIS PV. VESICATORIA) BIOCONTROL BY USING POTENTIAL ANTAGONIST BACTERIA IN TURKEY

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Abstract

Bacterial leaf spot of pepper and tomato caused by Xanthomonas axonopodis pv. vesicatoria, is one of the most serious diseases in many areas. The disease affects stems, leaves and fruits and causes significant losses when environmental conditions are suitable for the pathogen. Different strategies have been employed for controlling the disease such as sanitation, chemical control by using copper and streptomycin sprays. Also, biological control of the disease by treatment with antagonistic bacteria was also reported. In an attempt to control this disease biologically, the antibacterial activity of isolated 83 bacteria strains in Turkey was tested in vitro condition utilizing PSF agar. A paper disc was placed at the under of plate, and potential bacteria were inoculated on nutrient medium to test their effectiveness against *Xanthomonas axanopodis* pv. *vesicatoria*. After 25 h, the phytopathogenic bacteria *Xanthomonas axanopodis* pv. *vesicatoria* (grown in NA at 26 °C overnight) was sprayed on the plate inoculated with potential antagonist bacteria. The plates were incubated at 26 °C till the inhibition zone appeared. Antibacterial activity was assessed by measuring the average diameter of the clear zone of inhibition. Among these potential antagonist bacteria, seven of them were found effective against bacterial spot of tomato agent. The degree of shown antagonism varied from 5 to 8 mm. These results confirmed that the antagonists produce some type of toxic substance with antimicrobial effect against *Xanthomonas axanopodis* pv. *vesicatoria*, causing inhibition of the pathogen growth.

Keywords: *Bacterial leaf spot, biocontrol, pepper, tomato.*

APPLICATIONS OF NICHE DISTRIBUTION MODELS IN WEED MANAGEMENT DECISIONS: *AVENA STERILIS* AS AN EXAMPLE

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Abstract

Niche distribution models or alternatively termed as species distribution models have revolutionized the invasion science since last decades. However, the applicability of these models is still limited in Weed Science. The rapid changes in climate and associated weed flora shifts or weed invasion offer challenging tasks for weed managers. Niche distribution models can predict the expected weed shifts and provide valuable insights for weed managers under changing climate. In this study, we predicted the expected range shifts of *Avena sterilis* L. under changing climate in Turkey. For model calibration, we used the available occurrence records of the species in the world through different sources, such as GBIF and published literature. Maximum Entropy Model (MAXENT) was used to predict the potential range shift of the species. The model was calibrated on global scale and projected on regional scale i.e., Turkey. Nineteen bioclim variables were used as predictors. Since MAXENT needs absence data as well and absence data are hard to find in the literature, we used pseudoabsences for calibrating the model. The pseudoabsences were placed by buffering the presences at a distance of 30 km. The model was projected for current climate, 2030, 2050 and 2080. For each climate scenario, the model was run for 25 times and then all runs were combined through ensemble modeling approach to get a final binary map. The results indicated that changing climate would result in dramatic range shifts of the species. The species was expected to shift to the other parts of the country where distribution was currently limited. It is therefore concluded that weed managers in these regions should be careful at the first records of the species to stop its undue invasion. Moreover, alternative management options should be developed to control the species.

Keywords: *Avena sterilis, Niche distribution model, Climate change, weed shifts.*

COLD-STORAGE POSSIBILITIES OF WHITEFLY PARASITOID *ERETMOCERUS MUNDUS* (HYMENOPTERA: APHELINIDAE) PUPAE

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Abstract

Bemisia tabaci (Hemiptera: Aleyrodidae) is an important agricultural pest causing economic loses by direct feeding, honeydew contamination and virus transitions in host plant. Control of this pest species can be achieved by chemical or biological control methods. In Turkey, *Eretmocerus mundus* is an indigenous natural enemy of the *B. tabaci* and it is used in augmentative biological control programs. The success of the biological control programs depend on the mass production quality of parasitoid, release time and host:parasitoid ratio. In addition, storage possibilities of the natural enemies are another factor that improves mass production and augmentative biological control programs. Therefore, the aim of this study was to determine the effects of cold-storage on the survival of *E. mundus* red eyed pupal stage. In storage experiments, firstly, ten red-eyed parasitized white fly pupae were transferred on 3 x 0.5 cm size done sided sticky paper and placed in Eppendorf tube. The tubes were then moved in an incubator adjusted to 5 and 10 °C and complete dark conditions. After 4, 8 and 12 days, 10 tubes (100 pupae) were transferred to 25 °C to determine adult emergence. One hundred red eyed-pupae obtained from colony were also transferred and stored at 25 °C as control. After 4 days storage period, the survival rate of pupae (92%) was found to be close to control (96%), at 5°C. At the same temperature, the survival rates were then reduced to 76 and 74% after 8 and 12 days, respectively. The same rates were found to be 94 and 96% for 4 and 8 days, respectively at 10 °C, and they were not statistically different from control ($P>0.05$). In conclusions, we found that *E. mundus* pupae may be stored for 8 days at 10°C with the high survival rate.

Keywords: *Whitefly, Eretmocerus mundus, cold-storage, augmentative biological control.*

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ACARICIDAL EFFECT OF OLIVE MILL WASTE WATER AGAINST *TETRANCYHUS CINNABARINUS* BOISDUVAL (ACARI: TETRANCYHIDAE) UNDER LABORATORY CONDITIONS

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Abstract

Tetranychus cinnabarinus is (Acari: Tetranychidae) one of the important mite species that feed on more than 120 plant species including agricultural crops. Nowadays, chemical control is one of the most intensively used methods in control of this species. Contrary, intensive uses of the pesticides cause serious problems in the environment, consumer and control of spider mites population due to increasing resistance level. To overcome these problems, alternative control methods have been continuously investigated by the stake holders. In addition to biological control, plant derived pest control products are also used against insect and mites species in different agricultural production systems. Among them, biocide effects of olive mill wastewater (OMWW) have been known against some plant pathogenic fungus, bacteria and weed species. However, acaricide effect of OMWW against spider mites has not been investigated. Therefore, in this study, acaricidal effects of OMWW against *T. cinnabarinus* were assessed with the use of slide dip, dry film and direct spray method with the comparison of registered acaride abamectin and control. According to results, experiments conducted with the OMWW obtained from three different olive mill factories, the percent mortality rate of the *T. cinnabarinus* changed from 95 to 100% in slide dip and direct spray methods, respectively. But the mortality rates of the *T. cinnabarinus* were very low at dry film method and changed between 14 to 58%. In the abamectin, no one of the spider mites survived after 24 hours application in all three methods. In addition, high level of phytotoxicity was observed in direct spray of the OMWW to the plants. As conclusion, acaricidal effects of OMWW showed differences according to OMWW sources and found to be low. Further studies are required to clarify the acaricidal effects of OMWW with the efforts of reducing phytotoxicity to the host plant.

Keywords: *Olive Mill Wastewater, Tetranychus cinnabarinus, bioassay.*

Acknowledgement

This study was supported by TUBITAK (Scientific &Technical Research Council of Turkey), Grant No: 111G150.

SEASONAL DYNAMICS OF *BEMISIA TABACI* (GENN.) (HEMIPTERA: ALEYRODIDAE) SPECIES COMPLEX IN COTTON GROWING AREAS OF ADANA, TURKEY

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Abstract

The Çukurova plain of Adana, located in eastern Mediterranean region of Turkey, is one of the largest cotton growing areas of Turkey. *Bemisia tabaci* (Gennadius) (Hemiptera: Aleyrodidae) is an important pest of cotton and known as a species complexconsisting of at least 34 sibling species. MEAM1 and MED (also referred to as biotypes B and Q respectively) are the two most invasive species found sympatric in the region. Although there are numerous data on species composition of *B. tabaci,* there has not been any study on seasonal population dynamic of the species. Therefore, the aim of this study was to determine seasonal dynamics of *B. tabaci* species complex in the cotton fields of Çukurova plain. *B. tabaci* adults were collected from cotton fields located at Ceyhan, İmamoğlu, Karataş, Seyhan, Tuzla, Yumurtalık and Yüreğir districts in Adana at three times in June, August and September during 2015 growing season. Two molecular methods, Microsatellite Fragment Analysis (MFA) and PCR-RFLP were used for identification of the species. Five hundred sixtyfour individuals collected from 102 cotton fields were used in the analyses. According to MFA and PCR-RFLP analyses, 66% and 34% of the total *B. tabaci* studied individuals were found to be MED and MEAM1 species, respectively. Seasonal dynamic of species complex changed according to locations. In the early season (June), MED was dominant in the samples collected at Ceyhan, Seyhan, Karataşand Yüreğir). The highest and lowest MED ratios were found in İmamoğlu and Tuzla with 100% and 33.3%, respectively. When compared to early season (June), MEAM1 population increased at the end of the late season (September). We concluded that findings of this study would contribute to the management of *B. tabaci* depending on the species structure in cotton areas of Adana, Turkey.

Keywords: *Cotton, whitefly, MED, MEAM1,Turkey.*

Acknowledgement

This study is the part of MSc study of the first author and supported by Çukurova University Research Project Unit, Grant No: FYL-2015-4297.

CHEMICAL COMPOSITION OF ESSENTIAL OIL OF ANISE, CUMIN, FENNEL AND PARSLEY SEEDS

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Abstract

The essential oils of seeds of anise, cumin, fennel and parsley provided from Saudi Arabia were extracted by hydrodistillation, and analysed by GC and GC-MS. The percentage yields of the essential oils from seeds were 0.81%, 1.28%, 0.64 % and 0.52% v/w, respectively. The major constituents varied depending on species. The oil was colourless to pale-yellow in colour. More than 90% of the studied essential oils constituents were identified. It seems that there were partly similarities among chemical compositions of the four essential oils. In some of essential oils, the main constituents accounted for more than 60% of total oil, e.g., anise and fennel (E-anethole 93.00% and 62.63%, respectively). The main components were E-anethole (93.00%), γ-himachalene (2.85%), methyl chavicol (1.13%) and appiol (0.22%) in anise oil; E-anethole (62.63%), fenchone (13.27%), methyl chavicol (11.19%) and limonene (7.98%) in cumin oil; β-pinene (36.46%), γ-terpinene (36.29%), p-cymene (10.43%), terpinene-7-al-γ (3.48%), sabinene (2.02%) and α-pinene (1.92%) in fennel oil and α-pinene (39.27%), β-pinene (29.61%), limonene (9.73%), myristicin (6.70%), appiol (4.75%), myrtenal (1.82%) and sabinene (1.59%) in parsley oil.

Key words: *spice seeds, essential oil, composition, methyl chavicol, E-anethole.*

MARKER-ASSISTED SELECTION FOR RESISTANCE AGAINST ANGULAR LEAF SPOT DISEASE OF SOME TURKISH COMMON BEAN CULTIVARS

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Abstract

Common bean (*Phaseolus vulgaris* L.), belongs to the family fabaceae, is the most important grain legume for human diet worldwide. The productivity of common bean is constrained by several biotic and abiotic factors. Anthracnose, rust, angular leaf spot, and white-mold are among the main fungal diseases affecting the common bean. Angular leaf spot (ALS) disease is caused by the fungus *Pseudocercospora griseola*, which causes necrotic lesions on the aerial parts of the plant, reducing the productivity and quality of the bean seeds. The disease is widely spread of common bean growing areas in the Black Sea Region of Turkey. Using resistance cultivars is considered as the most efficient approach to control ALS disease. Three independent dominant ALS resistance genes have been characterized and named as *Phg* genes. Molecular linked-markers have been used to investigate the presence of these resistance genes in the cultivars and breeding lines. However, there is not any comprehensive information about the genes of Turkish common bean cultivars, until now. In this study, 43 Turkish common bean cultivars were screened with sequence-tagged sites (STS) markers and sequence characterized amplified region (SCAR); TGA1/570bp-SH13/520bp, SN02/890bp and g2303/350bp-SF10/1050bp for *Phg-1*, *Phg-2* and *Phg-3/ON*, respectively. The results showed the presence of all resistance loci in Turkish common bean cultivars. These cultivars were found to contain predominantly the *Phg-2* gene for ALS resistance. It was possible to select lines with disease resistances. This work represented the use of MAS for resistance-related gene screening.

Keywords: *Common bean, ALS, Marker-assisted selection, Disease resistance.*

Acknowledgement

This study was financially supported by the Research and Development Unit (BAP) of Abant Izzet Baysal University (Project Number: 2016.10.07.1091).

ANTIFUNGAL EFFECT OF SALVIA SCLAREA L. ESSENTIAL OIL ON GROWTH OF FUSARIUM OXYSPORUM F. SP.RADICIS-LYCOPERSICI JARVIS & SHOEMAKER AND VERTICILLIUM DAHLIAE (KLEB.)

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Abstract

Antifungal activities of *Salvia sclarea* L. on *Fusarium oxysporum* f. sp.*radicis-lycopersici* Jarvis & Shoemaker and *Verticillium dahliae* (Kleb.) were investigated in 2017 year. The plant essential oil was hydro-distilled in Clevenger's apparatus from the air-dried aerial parts. Plant essential oils at 0.5, 1, 2, 4, 8 µl/petri dishes concentrations were applied to determine their inhibition effects on mycelium growth of plant pathogenic fungi under laboratory conditions. Petri dishes were incubated at 25±2 ^{o}C for 7 days. Mycelium growth was measured by digital calipers and the inhibition rates were calculated. The *S. sclarea* essential oil caused inhibitory effects on mycelium growth of plant pathogenic fungi. Antifungal activity displayed differences according to increasing essential oil concentration and fungi. According to the results, mycelium growth of *Verticillium dahliae* and *Fusarium oxysporum* f. sp.*radicis-lycopersici* was decreased with increase in dose of *S. sclarea* essential oil. The mycelium growth of *Verticillium dahliae, Fusarium oxysporum* f. sp.*radicis-lycopersici* was decreased at 8 µl/petri dishes concentration, 46.49%, 39.06% respectively. In conclusion, this study has been shown that *S. sclarea* essential oil has a phytotoxic effect on plant pathogenic fungi.

Keywords: *Antifungal activity, essential oil, Salvia sclarea, sage.*

EFFECTS OF *SALVIA OFFICINALIS* ESSENTIAL OIL ON *VERTICILLUM DAHLIAE KLEB.* MYCELIUM DEVELOPMENT

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Abstract

Verticillium dahlia Kleb. is an important fungus that infects hundreds of plants. In this study, the antifungal effects of *Salvia officinalis* L. essential oil (cultural form) grown in Tokat (Turkey) was screened against *Verticillum dahliae*. The plant essential oil was hydro-distilled in Clevenger's apparatus from the air-dried aerial parts. Sterile potato dextrose agar (PDA) was cooled in a water bath at 40^{o}C, and the PDA was poured into 60-mm petri plates (10 ml plate^{-1}) and an agar disc (5 mm in diameter) of *V. dahliae* pathogens (from 7 day-old PDA cultures) was inoculated on medium. Essential oil was impregnated in paper adhered to the petri dish at doses of 1, 3, 5, 7 and 10 µl. They were incubated at 25±2 ^{o}C for 7 days in incubator. After this time the mycelium diameters were determined. The essential oils of S. officinalis were determined to effective against *V. dahliae*. *S. officinalis* essential oil inhibited 42.36% at 10 µl/petri dose mycelium development of *V. dahliae*. In conclusion, sage essential oil have potential as antifungal agent.

Keywords: *antifungal activity, essential oils, Salvia officinalis, sage, Verticillum dahliae.*

THE EVALUATION OF ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES OF *ORNITHOGALUM UMBELLATUM* L.

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Abstract

Recently, there has been a considerable interest in finding natural antioxidants and antimicrobials from plant materials to replace synthetic ones. *Ornithogalum umbellatum* grows naturally in almost all of Black Sea Region, mainly in Central and Eastern Black Sea. In the study, we collected edible *Ornithogalum umbellatum* species from ten different regions widely consumed in Ordu-Turkey and analyzed antioxidant activities, total phenolics and the antibacterial activities of methanolic extracts prepared from these plants. Methanol extracts of *Ornithogalum umbellatum* were applied at different concentrations in order to observe and evaluate their antibacterial activities. Antibacterial activities of extracts were determined using agar disc diffusion method. *Escherichia coli* and *Staphylococcus aureus* were used as model microorganisms representing gram negative and gram positive bacteria, respectively and *Listeria monocytogenes* was included as a food borne pathogen. All selected bacteria were grown until mid-log phase in appropriate media and following their plating on Mueller-Hinton agar, discs that were impregnated with different concentrations of extracts were placed on the agar. After incubation, the inhibition zones around the discs were measured and the results were evaluated accordingly. The total phenolic content in the samples was analyzed by the Folin-Ciocalteu colorimetric method. The free radical scavenging activity of the sample extracts was measured using the DPPH (1,1-diphenyl-2-picrylhydrazyl) method. Total phenolic content and antiradical activity results were expressed as mg GAE g^{-1} and mg/mL, respectively. As a consequence, the differences were determined among the samples in terms of antioxidant and antimicrobial activities.

Keywords: *Antimicrobial, antioxidant, phenolic compounds, Ornithogalum umbellatum.*

PHENOLIC AND ANTIOXIDANT PROPERTIES OF PERSIMMON FORTIFIED ICE CREAM

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Abstract

Persimmon is a popular and widespread fruit because it is a good source of antioxidants and polyphenols. Some scientists have reported that the persimmon is one of the richest fruits containing bioactive components. Ice cream is often preferred by people of all ages due to the cooling effect. Because it is a milk-based dessert, the nutritional value of ice cream is high. The development of functional ice cream formulations that are highly enjoyed by consumers has gained importance in the ice cream production sector. In the study, persimmon puree was incorporated into the ice cream mix at different concentrations (0, 15, 25 and 35%) and bioactivity (antiradical activity and total phenolic content) of samples were investigated. The sample preparation method consisting of extracting phenolic compounds from fortified ice cream by a acidified methanol (0.1 % HCI) solution as an extracting solvent. The contents of total phenolics in samples were analysed by the Folin–Ciocalteu colorimetric method. The free radical-scavenging activity of sample extracts were measured using the DPPH (1,1-diphenyl-2-picrylhydrazyl) method. Total phenolic content and antiradical activity results were expressed as mg GAE/kg and mg/kg product, respectively. As a consequence of the increase in the addition of the persimmon, the bioactive properties of the ice cream samples improved during storage. Study demonstrated that persimmon might be used as a functional food ingredient for promoting human health.

Keywords: A*ntioxidant, phenolic compounds, persimmon.*

DETERMINATION OF BISPHENOL A (BPA), BISPHENOL A DIGLYCIDYL ETHER (BADGE) AND ITS DERIVATES IN DIFFERENT CANNED FOODS

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Abstract

In this study, a method to analyze BPA, BADGE and its derivatives in different canned foods has been developed and comprehensively internally validated. One hundred and eleven food samples were analyzed for BPA, BADGE and its derivatives by using this validated method. BPA was found in 86 samples (with the highest value of 0.393 mg/kg in black olive), BADGE was found in 17 samples (with the highest value of 0.062 mg/kg in canned tuna fish), BADGE.H2O was found in 91 samples (with the highest value of 1.182 mg/kg in canned tuna fish), BADGE.HCl.H2O was found in 77 samples (with the highest value of 0.147 mg/kg in mackerel), BADGE.H2O was detected in one stuffed green pepper sample (0.028 mg/kg), BADGE.2HCl was found in 48 samples (with the highest value of 0.118 mg/kg in stuffed grape-leaves), and BADGE.HCl was found in 6 samples (with the highest value of 0.161 mg/kg in chickpea). In addition, pH, acidity, salinity and total fat analysis were also performed and the relation between the results of these analyses and the results of the analyses were statistically investigated. Reliable results could not be achieved because of some uncontrollable variables. And also, in order to verify the values of BADGE determined in samples, BADGE degradation has been simulated. To represent the BADGE in analyzed samples, degradation simulation was performed in 1% NaCl (pH:4), 1% NaCl (pH:6), 5% NaCl (pH:4), 5% NaCl (pH:6) and olive oil simulants, through two different groups stored at the temperatures of 25°C and 120°C.

Keywords: *Bisphenol A, Bisphenol A Diglycidyl Ether, BADGE derivatives, Canned Food, Migration.*

EFFICACY OF SOME ACARICIDES AGAINST ABAMECTIN-RESISTANT *TETRANYCHUS URTICAE* POPULATION FROM ANTALYA, TURKEY

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Abstract

A population of *Tetranychus urticae* Koch. (Acari: Tetranychidae) was collected from Kumluca (Antalya) in 2016 and reared on potted cowpea at 24 ± 1 ºC, photoperiod of 16:8 h L:D. The LC_{90} value of this greenhouse population for abamectin (284 mg active ingredient /l) was much higher than that of the recommended dose of this acaricide (4.5 mg a i /l). This abamectin-resistant *T. urticae* population was used in all bioassays. In this study the efficacy of bifenazate and spiromesifen against this population were investigated in laboratory leaf-dip bioassays. Furthermore, the efficacy of abamectin on adult females of the same population was determined at the recommended dose using both leaf-dip (=residue) and mites-dip (=contact +residue) bioassays. Bifenazate was assayed on adult females and spiromesifen was tested on larvae. The LC_{90} values for bifenazate and spiromesifen were 304, 457 mg a i /l, respectively. These values were higher than that of the recommended doses of these two acaricides (144 mg a i /l for bifenazate and 120 mg a i /l for spiromesifen). These results suggest that the efficacy of bifenazate and spiromesifen may be low in the collection site of this *T. urticae* population. Mortality values from leaf-dip and mites-dip methods were significantly different at the same dose of abamectin. Mortality rate was 41 % in leaf-dip bioassay, however, mortality was increased up to 93 % in mites-dip bioassay. These results with two methods suggest that data from several different bioassays should be considered for correct evaluation of pesticide effectiveness.

Keywords: *Tetranychus urticae, acaricides, bioassays, efficacy, Antalya.*

A SURVEY STUDY: PEST PROBLEMS AND PEST MANAGEMENT STRATEGIES OF FARMERS IN BURSA PROVINCE (TURKEY)

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Abstract

Climate condition of Bursa province (Turkey), characterized with temperate and humid conditions, is ideal for growing many cultivated plants. This climate also enables quickly development of many insect and mite pests and they generally cause high economic damage in these plants. Although the Turkish Food, Agriculture and Livestock Ministry has been regulated Integrated Pest Management programs and registered new synthetic insecticides to target specific as well as biorational, biotechnological and biological products, the usage habits of these products by growers has not been determined in Bursa, yet. This face to face survey study aims to evaluate both common pests and their management strategies based on grower declarations in Bursa from October 2016 to April 2017. Among 542 growers, most of respondents were middle and old aged (40-50 years old in 34%; 50< years old in 49%) and low education level (86% graduated from primary school). Reflecting production pattern of the region, 15 and 14% of our participants have grown olive and wheat, respectively. Among other 26 cultural plants, the second common species were corn, tomato, cherry, sunflower and pepper with 5-9% of all participants. Moth (14.5%), fruit fly (13.8%) and mite (10.2%) species were reported as key pests. While most of the respondents (90.8%) have used just synthetic insecticides to these pests, few participants have applied biotechnical materials (%1.6), microbial toxins (4.6%) and botanical extracts (4.6%) self-prepared from stinging nettle, tobacco and chili pepper. An aqueous extract obtained from cigarette butt was the most common usage of nicotine extract. Except these traditional method, all of respondents declared that they have never used any commercial biological and botanical products. It seems that Bursa farmers are not aware of registered environmental friendly products against above mentioned pests. In order to change this situation, further education and advertising activities about new environmentally compatible pest management strategies should be performed in Bursa.

Keywords: *Botanical insecticides, Bursa, Pest management, Survey, Synthetic insecticides.*

DETERMINATION OF EFFECTIVENESS OF VARIOUS ATTRACTANTS FOR MEDITERRANEAN FRUIT FLY, *CERATITIS CAPITATA* (WIEDEMANN) (*DIPTERA: TEPHRITIDAE*) ON CITRUS IN TURKEY

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Abstract

The Mediterranean fruit fly (Medfly), *Ceratitis capitata* (Wiedemann) (Diptera: Tephritidae), is a serious pest on citrus in Turkey. The study was conducted to compare effectiveness of different attractants for Medfly at Satsuma and W-Murcott orchards in Hatay province of Turkey. Two studies were conducted in Dörtyol and Reyhanlı districts of Hatay province with different attractants; ammonium acetate (AA), ammonium carbonate (AC), trimethylamine (TMA), putrescine (P), Diaminoalkane or cadaverine (C). A homemade plastic wipes were prepared and contained a 25 ml concentration from mixed attractants, propylene glycol (10%) and DDVP (4%). The Decis traps were used as traps hanged with homemade plastic wipes at 1-1.30m above ground on the tree branches. The study was conducted as randomized complete blocks design with five treatments and five replicates. The first study was carried out on Satsuma mandarin in Dörtyol district. A total of 1899 Medfly adults were caught by attractant traps during the sampling periods. The highest number of Medfly adults was caught by TMA+AA+P attractant traps, while the lowest was caught by AC attractant traps. The second study was carried out on W-Murcott mandarin in Reyhanlı district. A total of 1813 Medfly adults were caught by attractant traps during the sampling periods. The highest number of Medfly adults was caught by AA attractant traps, whereas the lowest number was caught by AA+AC attractant traps.

Key words: *Medfly, Ceratitis capitata, citrus, attractant traps, Turkey*.

CONTROL OF THE MEDITERRANEAN FRUIT FLY, *CERATITIS CAPITATA* (WIEDEMANN) (DIPTERA: TEPHRITIDAE) BY MASS TRAPPING IN TURKEY

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Abstract

The Mediterranean fruit fly (Medfly), *Ceratitis capitata* (Wiedemann) (Diptera: Tephritidae), is one of the important pests of citrus in Turkey. The study was conducted in 2011-2012 to evaluate control of Medfly by mass trapping on Satsuma mandarin in Hatay Province of Turkey. The Econex trimedlure (95%) (last three months), Econex DDVP and Econex Invaginated EOSTRAP were used. In the first year, fourty-eight Econex Invaginated EOSTRAP with the Econex trimedlure (95%) and Econex DDVP were placed on Satsuma mandarin from 1 August to December. In the second year, twenty-three Econex Invaginated EOSTRAP with the Econex trimedlure (95%) and Econex DDVP were placed in the same site from 14 August to December. The traps were weekly checked and adults of Medfly were counted and after the counting the traps were cleaned. The damage rates of Medfly were recorded during the harvest periods. The Econex trimedlure (95%) were replaced with new ones in every 90 days. In the first year, a total of 8,968 Medfly adults were caught by traps. The highest number of the Medfly adults were caught by in October (6396), followed in November (909), September (587) and August (105). In the second year, a total of 1,307 Medfly adults were caught by traps. The highest number of the Medfly adults were caught by traps in September (420), followed in November (349), October (214) and August (48). The damage rates of Medfly were 10.91 and 8.56 % in 2011 and 2012, respectively.

Key words: *Medfly, Ceratitis capitata, mandarin, mass traps, Hatay province.*

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EVALUATİON OF EFFECTİVENESS OF DİFFERENT ATTRACTANTS FOR MEDİTERRANEAN FRUİT FLY, CERATİTİS CAPİTATA (WİEDEMANN) (DİPTERA: TEPHRİTİDAE) ON POMEGRANATE FRUİTS İN TURKEY

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Abstract

The study was conducted in 2013-2014 to determine effectiveness of different attractants for Mediterranean Fruit Fly (Medfly) *Ceratitis capitata* (Wiedemann) (Diptera:Tephritidae) in Hatay province of Turkey. In the first year, the study was conducted at Katırbaşı pomegranate orchards. In the second year, the study was conducted at Hicaz and Katırbaşı pomegranate orchards. In the first year, ammonium acetate (AA), yeast (Y) and ammonium carbonate (AC) were used as attractants. In the second year, ammonium acetate (AA), ammonium carbonate (AC), trimethylamine (TMA), acetic acid (ACE), ammonium bicarbonate (AB), di-ammonium phosphate (DAP) and cadaverine (C) were used as attractants. Transparent 500 ml polyethylene bottles with four holes were used as traps. Each of the traps consisted of 300 ml of one of the attractants, 2 ml of propylene glycol (10%) and 2 ml of DDVP (2%). They were hanged at 1-1.30 m above ground on the tree branches. Two studies were conducted as randomized complete blocks design with five replicates. In the first year, a total of 2789 Medfly adults (1,619♀, 1,170♂) were caught by different attractants on Katırbaşı pomegranate. The highest number of Medfly adults (♀♂) was caught by AA+AC attractant traps. In the second year, a total of 7,830 Medfly adults (5,295♀, 2,535♂) were caught by different attractant traps in Hicaz pomegranate. A total of 3,400 Medfly adults (2,306 ♀, 1,094 ♂) were observed in different attractant traps on Katırbaşı pomegranate. The highest number of Medfly adults (♀♂) were caught by AB+AA attractant traps in both trials.

Key words: *Medfly, Ceratitis capitata, pomegranate, attractant traps, Turkey.*

Acknowledgement

This project was supported by University of Mustafa Kemal of Scientific Research Projects (BAP) (project number: 11965).

A STUDY ON POPULATİON TRENDS OF THE HONEYDEW MOTH, CRYPTOBLABES GNIDIELLA MILL. (LEPIDOPTERA: PYRALIDAE) İN POMEGRANATE ORCHARDS BY USİNG PHEROMONE TRAPS

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Abstract

The Honeydew Moth, *Cryptoblabes gnidiella* Mill. (Lepidoptera: Pyralidae), is one of the most important pest of pomegranate in Turkey. This study was conducted to determine the distribution, population density and damage rate of honeydew moth on pomegranate orchards in Hatay province of Turkey. The study was carried out in seven different pomegranate orchards between 27 May and 23 December 2012 and in four different orchards between 5 May and 8 December 2013. All of the orchards were composed of 'Hicaz' variety. Pheromone traps were checked weekly and captured adults were counted and cleaned. Pheromones in the yellow traps were replaced with new ones in every 40 days. During the harvest time, except for the ones from pheromone trap hanging tree, 100 pomegranate fruits were randomly selected to evaluate the number of the damaged fruits in each pomegranate orchard. The honeydew moth was caught in all of the pomegranate orchards. The population density of honeydew moth was significantly different in each of the sampled pomegranate orchards. In the first year, the highest number of the adults were caught by traps in October, following in September, August, July, June, November and December. In the second year, the highest number of the adults were caught by traps in September, following in October, August, July, November, June, December and May. The damage rates observed were ranged from 4.5% to 9.5 % in 2012 and 6.75% to 12.25% in 2013.

Key words: *Honeydew moth, Cryptoblabes gnidiella, pomegranate, pheromone traps, Hatay province.*

Acknowledgement

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DETERMİNATİON OF EFFECTİVENESS OF VARİOUS ATTRACTANTS FOR OLİVE FRUİT FLY, *BACTROCERA OLEAE* (GMELİN) (*DİPTERA: TEPHRİTİDAE*) İN OLİVE ORCHARDS İN OSMANİYE PROVİNCE OF TURKEY

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Abstract

The olive fruit fly, Bactrocera oleae (Gmelin.) (Diptera: Tephritidae), is a serious pest on olives in Turkey. The study was conducted in 2015-2016 to determine effectiveness of different attractants for olive fruit fly, Bactrocera oleae (Gmelin.) (Diptera: Tephritidae) in Osmaniye province of Turkey. In 2015, two studies were conducted with ammonium acetate (AA), ammonium carbonate (AC), ammonium bicarbonate (AB), AB+AA and di-ammonium phosphate (DAP) attractants. In 2016, two studies were conducted with AC, AB, AB+AA, DAP, Ammonium sulfate (AS) attractants and Spiroketal. In 2015, transparent 500 ml polyethylene bottles with four holes were used as traps. Each of the traps consisted of 300 ml of one of the attractants, propylene glycol (10%) and DDVP (2%). The traps, hanged at 1-1.30 m above ground on the tree branches, arranged as 5 trees/trap and randomized complete blocks design with twelve replicates. In 2016, a homemade plastic wipes were prepared and contained a 25 ml concentration from mixed attractants. The Decis traps were used as traps. They were hanged with homemade plastic wipes at 1-1.30 m above ground on the tree branches, arranged as 3 trees/trap and randomized complete blocks design with five replicates. In 2015, a total of 260 adults were caught by traps in the first trial. The highest number of adults (♀♂) was caught by AB+AA attractant traps. In the second trial, a total of 174 adults were caught by traps. The highest number of adults (♀♂) was caught by AB+AA attractant traps. In 2016, a total of 394 adults were caught by traps in the first trial. The highest number of adults (♀♂) was caught by AC attractant traps. In the second trial, a total of 306 adults were caught by traps. The highest number of adults (♀♂) was caught by Spiroketal pheromone traps.

Key words: *Olive fruit fly, Bactrocera oleae, attractants, Osmaniye province.*

Acknowledgement

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DETERMINATİON OF EFFECTİVENESS OF VARİOUS ATTRACTANTS FOR OLİVE FRUİT FLY, *BACTROCERA OLEAE* (GMELİN) (*DİPTERA: TEPHRİTİDAE*) İN OLİVE ORCHARDS İN HATAY PROVİNCE OF TURKEY

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Abstract

The olive fruit fly, Bactrocera oleae (Gmelin.) (Diptera: Tephritidae), is a serious pest on olives in Turkey. The study was conducted in 2016 to determine effectiveness of different attractants for olive fruit fly, Bactrocera oleae (Gmelin.) (Diptera: Tephritidae) in Hatay province of Turkey. In 2016, three studies were conducted with ammonium carbonate (AC), Ammonium bicarbonate + Ammonium acetate (AB+AA), di-ammonium phosphate (DAP), Ammonium sulfate (AS) attractants and Spiroketal. In 2016, a homemade plastic wipes were prepared and contained a 25 ml concentration from mixed attractants. The Decis traps were used as traps hanged with homemade plastic wipes at 1-1.30 m above ground on the tree branches. Traps were arranged as 3 trees/trap. Three studies were conducted as randomized complete blocks design with five replicates. In the first study, a total of 2,489 olive fruit fly adults were caught by traps. In the second study, a total of 2,929 olive fruit fly adults were caught by traps. In the third study, a total of 2,804 olive fruit fly adults were caught by traps. The results of three studies indicated that the highest number of olive fruit fly adults (♀♂) were caught by DAP attractant traps, followed by AB+AA, AC, AS attractant traps and Spiroketal pheromone traps.

Key words: *Olive fruit fly,* Bactrocera oleae, *attractants, Hatay province.*

Acknowledgement

This project was supported by University of Mustafa Kemal of Scientific Research Projects (BAP) (project number: 16240).

EVALUATION OF EFFECTIVENESS OF VARIOUS ATTRACTANTS FOR MEDITERRANEAN FRUIT FLY, *CERATITIS CAPITATA* (WIEDEMANN) (*DIPTERA: TEPHRITIDAE*) ON PERSIMMON ORCHARDS IN TURKEY

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Abstract

The Mediterranean fruit fly (Medfly), *Ceratitis capitata* (Wiedemann) (Diptera: Tephritidae), is a serious pest on persimmon in Turkey. The study was conducted to compare effectiveness of different attractants for Medfly at persimmon orchards in Hatay province of Turkey. Two studies were conducted in Dörtyol district of Hatay province with different attractants: ammonium acetate (AA), ammonium carbonate (AC), trimethylamine (TMA), putrescine (P), Diaminoalkane or cadaverine (C). A homemade plastic wipes were prepared containing a 25 ml concentration from mixed attractants, propylene glycol (10%) and DDVP (4%). The Decis traps were used as traps hanged with homemade plastic wipes at 1-1.30m above ground on the tree branches. The study was conducted as randomized complete blocks design with five treatments and five replicates. In the first study, a total of 470 Medfly adults were caught by attractant traps during the sampling periods. The highest number of Medfly adults was caught by AA+AC attractant traps, while the lowest was caught by AC attractant traps. In the second study, a total of 407 Medfly adults were caught by attractant traps during the sampling periods. The highest number of Medfly adults was caught by AA+AC attractant traps, whereas the lowest number was caught by TMA+AA+C attractant traps.

Key words: *Medfly, Ceratitis capitata, citrus, attractant traps, Turkey.*

DETERMINATION OF ANTIBACTERIAL AND ANTIFUNGAL EFFECTS OF GRASS PEA (*LATHYRUS SATİVUS* L.)

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Abstract

Due to their rapid growth characteristics and the changes they make in their genetic structures, the microorganisms have been gaining resistant against the antimicrobial agents every other day. The facts that synthetic drug development takes long years and the production costs and the side effects of synthetic drugs on humans have led the scientific world to discover new and natural antimicrobial agents. Investigation of antimicrobial properties of medical plants naturally found and particularly being endemic in our country plays a substantial role for the discovery of new antimicrobial substances. In the study, antibacterial and antifungal effects of extract to be obtained from grass pea were investigated. The above-ground parts of the grass pea seedlings were shredded and their seeds were grounded, 500 mg was put into 5 ml (100 mg/ml) in falcon tube and shaked on a magnetic shaker for 48 h. and then, the extract was obtained by santrifuging at 10 000 rpm. In the study, the extracts taken from the above-ground parts of 20-day-old seedlings and from seeds of grass pea (*Lathyrus sativus L.*), sterile distilled water as control and 40% commercial bleach (containing 5% sodium hypochlorite) were used in surface sterilization of the seeds of flax (*Linum usitatissimum* L.) cv. 'Madaras' obtained from "Crop Science Laboratories" in North Dakota, USA. At the end of the study, it was determined that extract obtained from grass pea seedlings and grounded seeds prevented bacteria and fungi growth under *in vitro* conditions.

Key words: *Grass pea, Lathyrus sativus L., microorganism, antibacterial effect, antifungal effect*

DETERMINATION OF EFFICACY OF SOME BIOLOGICAL PREPARATIONS TO VERTICILLUM WILT OF OLIVE (*VERTICILLIUM DAHLIAE*)

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Abstract

Verticillium wilt is a soil-borne fungus disease caused by *Verticillium dahliae*. It is one of the most serious diseases of olive trees worldwide and in Turkey, because it can kill trees and is difficult to control. The biological control of pathogens can be considered in established olive orchards. This study was carrried out in 2015-2016 in the Köşk province in Aydın, Turkey and it is aimed to determine the effectiveness of mycorrhiza (ERS)-bio-pesticide (T22), harpin protein , bordeaux mixture and different combination of these treatments against *Verticillium dahliae*. ERS-T22 was applied to the olive trees from soil. The harpin protein tree was sprayed on the olive trees and injected into the tree's body. bordeaux mixture was applied to the olive soil and injected into the tree's body. Data were analyzed by Kurska-Wallis test. As a result of the applications, high efficacy results have been obtained in harpin protein, harpin protein+ERS-T22+bordeaux mixture and harpin protein and bordeaux mixture applications ($P \leq 0.05$). ERS-T22 and bordeaux mixture application it was found to have no single reinfection in areas where the symptoms of*verticillium dahliae* have previously been observed and that the disease symptoms did not spread to intact areas. After all, new exiles have not formed in these parts. Application of harpin protein and in combination with harpin protein, it was observed that the verticillium wilt disease was suppressed in the parts of the trees where the symptoms appeared, and it was found that the tree showed regeneration by regrowing development and foliage in the branches and dips. Based on the results we have obtained, it has been found that harpin protein has an effect on the activation of xylem in the olive and changed the course of wilt to regeneration.

Keywords: *Oliven, Verticillium dahliae, Aydın, Bordeaux mixture, Mycorrhiza (ERS)-bio-pesticide (T-22), Harpin protein.*

EFFICACY OF *FUSARUM SUBGLUTINANS* 8A ISOLATE ON *FRANKLINIELLA OCCIDENTALIS* (PERGANDE) ON INFECTED LEAF DISC

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Abstract

Frankliniella occidentalis (Pergande) (Thysanoptera: Thripidae) is a destructive pest on agricultural crops worldwide. It causes direct damage by feeding on plant parts and also indirect damage by transmitting plant viruses. However, due to its short generation time, high fecundity capability, haplodiploid reproduction system, thigmotactic behaviours, and fast resistance development to the pesticides makes difficult control practices of *F. occidentalis*. Efforts to control the pest and the thrips-vectored tospoviruses with calendar applications of broad-spectrum insecticides have been mostly unsuccessful. In this study, fatal effect of different spore concentrations of *Fusarium subglutinans* (8A) isolated from *Aphis gossypii* Glover in Mersin-Tarsus (Turkey) on *Frankliniella occidentalis* females was investigated. The experimental design was a complete randomized block and all trials were conducted in three replications in 2016. In the study, $1x10^4$, $1x10^6$ and $1x10^8$ spore/ml spore concentrations were applied to pepper leaves prepared according to leaf disc method by spray in droplets at 1 atm air pressure. Observations on mortality of female individuals and mycosis developing on dead individuals were conducted 3^{th}, 5^{th} and 7^{th} days after the application. Re-isolation of *F. subglutinans* (8A) from dead individuals was carried out by corresponding author. According to study results, the highest mortality rate was recorded in $1x10^8$ spore/ml and mortality rates were different than control in three spore concentrations ($P> 0.05$). Moreover, mycosis were not significant in three spore concentrations. The time-dependent mortality rates after application of *F. subglutinans* (8A) isolate were highest at 7^{th} day at 3 different spore concentrations and mortality rates were found the same at 10^4 spores/ml and 10^8 spores/ml ($P> 0.05$).

Keywords: *Biological control, Enthomopathogen fungi, Pest, Western flower thrips.*

DETERMINATION OF THE BIOLOGICAL EFFICACY OF THE *FUSARIUM SUBGLUTINANS* 12A ISOLATE AGAINST *TETRANYCHUS URTICAE* KOCH ON INFECTED LEAF DISC

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Abstract

Tetranychus urticae Koch. (Acarina: Tetranychidae) is polyphagous and one of the pests causing important economic losses worldwide. It causes damage on agricultural crops by feeding on the plant tissues and transmitting plant viruses. One of the important reasons that *T. urticae* has become a destructive agricultural pest develops insecticide and acaricide resistance around the world. Efforts to control the pest with calendar applications of broad-spectrum insecticides have been mostly unsuccessful. In this study, fatal effect of different spore concentrations of *Fusarium subglutinans* (12A) isolated from *Aphis gossypii* Glover. in Adana-Karataş (Turkey) on *T. urticae* females were investigated. The experimental design was a complete randomized block and all trials were conducted in five replications. In the study, $1x10^4$, $1x10^6$ and $1x10^8$ spore/ml concentrations were applied to common bean leaves prepared according to leaf disc method spraying in droplets at 1 atm air pressure. Observations on mortality of females and mycosis developing on dead individuals of *T. urticae* were conducted 3rd, 5th and 7th days of the application. Re-isolation of *F. subglutinans* (12A) from dead individuals was carried out by corresponding author. . As a result of the study, mortality rates were different than control in three spore concentrations, but they did not differ from each other ($P > 0.05$). Mycosis were not significant in three spore concentrations ($P<0.05$). The time-dependent mortality rates after application of *F. subglutinans* (12A) isolate were highest at 7th days at 3 different spore concentrations and mortality rates were found the same at 10^6 spores/ml and 10^8 spores/ml ($P > 0.05$).

Keywords: *Enthomopathogen fungi, Pest, Two-spotted spider mite.*

ANTIMICROBIAL ACTIVITY OF A COMMERCIAL OLIVE LEAF EXTRACT ON SELECTED FOODBORNE PATHOGENS

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Abstract

Phenolic extracts of plant materials have received more interest as they are generally recognized as safe (GRAS) food additives with antimicrobial and antioxidant properties. The olive tree (*Olea europaea* L.) has been cultivated from ancient times in the Mediterranean area mainly for its fruits. The phenolic compounds in olive leaf have biological activities including antioxidant, antimicrobial and antiproliferative activities. In this study, the antimicrobial activity of a commercial liquid olive leaf extract (OLE) was tested by disc diffusion assay against *Listeria monocytogenes*, *Bacillus cereus*, *Staphylococcus aureus*, *Escherichia coli* O157:H7, *Escherichia coli*, *Salmonella* Enteritidis and *Salmonella* Typhimurium. OLE was prepared in six different concentrations from 5 to 50% with both distilled water and dimethyl sulfoxide (DMSO). OLE prepared with DMSO or distilled water yielded larger inhibition zones against *L. monocytogenes* and *S. aureus* than the other bacteria tested. The higher OLE concentration resulted in larger inhibition zones for these two bacteria. The largest inhibition zones against *S. aureus* (13.67 mm) and *L. monocytogenes* (14.00 mm) were obtained by 50% concentration of OLE prepared with DMSO. For the rest of bacteria, the inhibitions zones were 9.33 mm or narrower regardless of concentration. Twenty percent of OLE prepared with distilled water showed antimicrobial activity only against *L. monocytogenes* while that prepared with DMSO did not yield any inhibition zones for all bacterial cultures. In conclusion, OLE may help to control the *S. aureus* and *L. monocytogenes* in foods and may be evaluated as a natural antimicrobial alternative to chemical preservatives.

Key words: *Olive leaf, foodborne pathogens, antimicrobial activity, disc diffusion assay*

INCREASING CASES OF HERBICIDE RESISTANT WEEDS IN TURKEY: IS THERE ENOUGH RESEARCH TO TACKLE THE PROBLEM?

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Abstract

Repeated use of herbicides with the same mode of action led to increasing reports of herbicide resistance across the world, while there are comparatively lesser reports in Turkey. Inadequate scientific research is the reason of comparatively lesser reports on herbicide resistant weeds in Turkey. Recently herbicide resistance works have gained pace and increasing cases of resistant weeds have been reported. However, research relating to detection mechanisms of herbicide resistance and management is still inadequate. Therefore, information and research gaps, and possible options to tackle the herbicide resistance problem in Turkey are hereby reviewed. Detection of herbicide resistance, although ongoing, yet concentrated on a few weed species (for example *Avena fatua*, *A. sterilis*, *Sinapis arvensis*, *Galium aparine* etc.). Specific regions rather than the whole country have been targeted and basic molecular tools (polymerase chain reaction) have been used so far to specify the resistance mechanisms rather than advanced molecular tools (genotyping, single nucleotide polymorphism discovery, RNA sequencing etc.). Increasing reports of resistant weeds suspect that evolution is playing a stronger role in developing herbicide resistance, which could lead to severe crop protection problems. Herbicide resistance, if ignored, could incur severe economic losses and necessitate the development of new herbicides which is always a challenging task. Hence, it is recommended that a comprehensive initiative must immediately be started like in other countries (Australia, for example) to survey, detect, map and manage herbicide resistance at national level. Additionally, the coverage of ongoing works should also be expanded to species and landscape levels.

Keywords: *Herbicide resistance, Weeds, Turkey, Challenges, Opportunities.*

IDENTIFICATION OF WEED SEEDS CONTAMINATING WHEAT GRAIN

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Abstract

The most important feature of weeds compared to cultivated plants, is that they have very high seed output and their longevity in the soil. The first step for the successful management of weeds is using weed-free crop seed. In modern agriculture, separation between weed seed and crop seed was minimized during the seed production and packaging. This study was conducted to identify weed seed contamination in wheat grains between 2014-2016. The wheat samples (average two kg) were taken from randomly selected six (in total 18) wheat grain sellers (crop seed or feed wheat seed) in the Adana province of Turkey. They were brought to the laboratory and examined for any weed seeds. As a method, the wheat grains and weed seed were separated using different sized sieves, then identified using different sources and collections. Corncockle (*Agrostemma githago* L., Caryophyllaceae) , Goosegrass (*Galium aparine* L., Rubiaceae), Field bindweed (*Convolvulus arvensis* L., Convolvulaceae), Jointed goatgrass (*Aegilops cylindrica* Host., Poaceae), Wild oat (*Avena sterilis* L., Poaceae), Italian thistle (*Carduus pycnocephalus* L., Asteraceae), Thistles (*Centaure*a spp., Asteraceae), Curly duck (*Rumex* spp., Polygonaceae) were found the most common weed seeds in the samples. Among these important weeds, Field bindweed is only perennial herbaceous weed which reproduces by seeds and rhizomes. On the other hand, some weed seeds are poisonous for both humans and livestocks such as Corncockle.

Keywords: *Weed, Seed, Grain, Wheat, Corncockle.*

RESEARCHES ON THE ROLE OF WEEDS AS A HOST OF ARTHROPOD AND DISEASE PEST IN AGROECOSYTEM

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Abstract

Weeds are one of the most important components of any agroecosytem. They compete with crop plants and they also affect them indirectly. These effects can occur in several ways of interaction between arthropod pests and weeds. Weeds can be the principal host, alternative or intermediary host, food or pollen source and overwintering site for many pests in the crop lands. The collaborative researches starting from 1991 in the Cukurova Delta in Southern Turkey have shown that several weed species had a relationship between pests including monophagous species (possible weed biocontrol agents). According to researches, 64 weed species have been the host of bacterial (epiphytics are included) and fungal pathogens causing important disease on crops such as *Spiroplasma citri* and rust fungi. Fourteen weed species have been the host of Tomato Spotted Wilt Virus, 81 species have been the host of *Frankliniella occidentalis*, 17 for *F. intonsa*, 20 for *Thrips tabaci*. Among these, 41 weed species have been the host of different insect pests such as mealybugs and aphids. For the successful management of diseases and insect pests, weed species must be observed and managed periodically. Certain weed species could be used as trap plant for some pests.

Keywords: *Weed, Pest, Insect, Relationship, Host.*

EFFECT OF PLANT-DERIVED ESSENTIAL OILS AND PLANT EXTRACTS ON SHELF-LIFE AND SAFETY OF FISH

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Abstract

Fish is a very perishable food and a potential source of bacterial pathogens. In recent years, natural antioxidants and antibacterials are preferred instead of chemicals to increase shelf-life and prevent growth of pathogens. Plant-derived essential oils (PEOs) and plant extracts (PEs) have significant preventative effects against spoilage and pathogenic microorganism growth in fish. Various PEOs and PEs obtained from herbs such as oregano, thyme, clove, rosemary, coriander, cilantro, cinnamon, ginger, marjoram, basil, pomegranate, green tea and grapefruit have been applied to various food products; and successful results in terms of food safety and shelf life have been achieved. The use of these natural preservatives answers the recent demand for minimally processed food having a natural or 'green' image. While the intense flavor of PEOs and PEs may limit their use, they can be combined with other preservation techniques to ensure successful results in sensory quality as well as to increase shelf-life and safety. Studies have shown that PEO and PE have beneficial effects on fish such as improving hygiene quality, delaying microbial growth, lengthening lag phase, delaying oxidation, maintaining good quality and safety. This review assesses studies on PEOs and PEs to improve the shelf-life and microbial safety, and provides an overview of their potential uses in fish.

Keywords: *essential oil, plant extract, seafood, fish.*

DETERMINATION OF SOME PHENOLIC COMPONENTS FROM THE SKIN, PULP AND SEED OF GRAPE CULTIVARS/CULTIVAR CANDIDATES

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Abstract

In this study, 22 grape cultivars/cultivar candidates developed by the Tekirdağ Viticulture Research Institute and the Yalova Atatürk Horticultural Central Research Institute in Turkey were used. The amount of phenolic acid (gallic acid, caffeic acid) and flavonoid (catechin, epicatechin) in the skin, pulp and seed parts of the grapes were analysed by the HPLC method. Gallic acid 0.756-0.573 mg / 100 g, epicatechin 1,055-0,050 mg / 100 g, caffeic acid 3.62-0.257 mg / 100 g were found in the pulp part of the grapes. Gallic acid 1.47-0.58mg / 100g, catechin 4.59-0.03mg / 100g, epicatechin 1.79-0.31 mg / 100g were found in the skin part of the grapes. Moreover, gallic acid 6.88-1.34 mg / 100 g, catechin 491.9-48.2 mg / 100 g, epicatechin 106.9-20.9 mg / 100 g were determined in the seed part. When all phenolics obtained from the cultivar/cultivar candidates were examined, it was determined that the seed part of the grape contained the highest amount of phenolic material, whilethe lowest phenolic material was in the pulp. It was also found that the dark colour (red or blue) cultivars/cultivar candidates generally contained higher phenolic compounds. Due topositive effects of phenolic compounds on human health, the cultivar/cultivar candidates used this study will be registered and disseminated. In addition, these grape cultivars/cultivar candidates will be recommended to grow in large areas.

Keywords: *Grape (Vitis vinifera L), phenolic compounds, HPLC, breeding, cultivar candidate.*

ECOLOGICAL PROTECTION OF TOMATOES AGAINST DISEASES IN ODESSA REGION (UKRAINE)

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Abstract

Tomatoes are one of the major vegetable crops in Ukraine. Protecting tomatoes against diseases is one of the most important measures for increasing yields. In ecological control in the field of plant protection, the use of biological products is based on microorganisms-antagonists. They produce a wide range of metabolites with antimicrobial effect. Therefore, the biopreparation may be the only alternative to chemical fungicides in protecting plants. Learning new methods of biological protection of plants is a topical issue and it is necessary to produce a clean crop by using biopreparations. During the growing season, there was a phytosanitary inspection of tomatoes on the field conducted for the presence of fungal and bacterial diseases in the farms of Odessa region. The first signs of fungal diseases were observed in early July. The spread of Alternaria was 37.05%, and late blight - 55.85%. The use of biological products, such as Tryhodermin BT and BT Planryz, led to a decrease of late blight and Alternaria by 59.9% and 55.9%, respectively. The infestation of plant bacterial diseases (bacterial canker and necrosis of the stem in the last week of August was 4%. The first appearance of the disease was in the third decade of June – first decade of July. Thus, on the territory of Odessa region, tomato plant diseases of fungal etiology were dominant over bacterial diseases for a small percentage. The use of Tryhodermin BT and Planryz BT in growing tomatoes is promising because it allows using environmentally-friendly products.

Keywords: *tomatoes, diseases, biological products, Odessa region.*

SENSITIVITY OF *FUSARIUM VERTICILLIOIDES* TO 3-HYDROXY-QUINOLONES

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Abstract

Fungicide effectiveness has been seriously affected in some situations by the development of resistance in target pathogens. In the present work, we aimed to study antifungal activity of *newly synthesized* 3-hydroxy-quinolones *derivatives. Previously, these compounds demonstrated the effective inhibition of the model system of transcription on the base of bacteriophage T7 DNA-dependent RNA polymerase.* As a test organism was used a Fusarium verticillioides fungus known as an activator of ear rot of maize, a potential producer of fumonisin toxin. As a result of studies were observed the inhibition of the growth and development of the fungal colonies by some of compounds. We also observed the changes of fungal pigmentation, destruction of the hyphae into separate fragments and appearance of balloon-shaped hyphae. New compounds significantly impact the architecture of the cell wall as well. It is known that melanin determines mycelium pigmentation and is a factor of fungal resistance to unfavorable development conditions such as influence of proteolytic enzymes and other compounds, disorders of metabolic processes involved in cell wall formation. Such morphological changes induced by 3-hydroxy-quinolone derivatives were similar to fluconazole action, which was used as a reference control. Therefore, this could indicate that such quinolone derivatives targeting on the fungal-specific biosynthesis of ergosterol and melanin and demonstrate the mechanism of action similar to triazole agents. Thus, 3-hydroxy-quinolones may exhibit properties not inherent to classical quinolone antibiotics.

Keywords: *Quinolone compounds, Properties, Fusarium verticillioides, Antifungal activity*

INFLUENCE OF CLIMATE CHANGES ON WHEAT VIRUSES VARIABILITY IN UKRAINE

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Abstract

Climate change is closely related to the level of losses from plant diseases because the environment significantly affects plants, pathogens and their vectors. Monitoring of viral infections in agrocenoses is one of the priority measures to preserve the harvest. However, often symptoms of the adaptive response of plants caused by environmental abiotic factors like the symptoms caused by infectious agents. In this regard, there is a problem to identify the reasons of pathological symptoms on the plants, as some of them are extremely important value for technologies of agricultural crops growing. The aim of work was to investigate the variability of composition of viruses' species infecting winter wheat, to study their prevalence in Ukraine under agro-climatic change conditions. The viral monitoring showed that the winter wheat plants cv. Russia and Smuglyanka with the yellowing symptoms on leaves and "purple-yellow" leaves were infected with BYDV. Unlike previous years, WSMV was not detected in this agrocenosis that can be related to the strong drought in autumn and considerable decline of HTC that resulted in limitation of quantity of WSMV vectors. The symptoms of leaf rolling in barley cv. Antigon, leaf yellowing of wheat cv. Ermak and leaves reddening in wheat Donetska-46 were caused by technogenic influence and other abiotic factors. The analysis of temperature indexes that characterize terms of overwintering and vegetation of winter wheat showed that in May (phase of beginning of plants earing) high plus temperatures during the day changed on low temperatures at night. It is necessary to notice that the reason for appearance of symptoms "purple-yellow" and "purple" leaves of winter wheat are changes of carbohydrate balance that arise up as a result of nonspecific reactions of plants to stress caused by virus infection (cv. Russia) or sharp temperature differential (cv. Vasylyna, Podolyanka, Albatros odessky, Myronivska-67, Smuglyanka).

Keywords: *WSMV (Wheat streak mosaic virus), BYDV (Barley yellow dwarf virus), climate changes, temperature difference, HTC (hydrothermal coefficient).*

THE DAMAGE OF THRIPS (*FRANKLINIELLA OCCIDENTALIS*) ON GREENHOUSE PEPPER IN THE BEJAIA REGION (ALGERIA)

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Abstract

In Bejaia, the vegetable crop takes fourth place after the arboricultures, oleicultures, and the great cultures ; Tomato, pepper, pepper, bean and cucumber the crops most grown by farmers in the region to obtain and improve their income. Many factors contribute to low yields, diseases, nematodes, mites and insect pests.The thrips is the insect that caused more damage to thevegetable cropsin Bejaia's region and the farmers find many difficultiesto control and combat them.In the present study, in order to know this problematic, surveys were carried out on a farm on a peppery crop in 2014 due to a discharge by 15 days for 8 months, Two sampling methods were used, Trap and direct counting of number of the thrips. The Thrips were put in a flask containing an alcoholic solution at 70 %.Thrips were sampled and identified under a microscope using morphological characteristics. To estimate the damage caused by the thrips, we take 60 plants randomly, they will be examined visually observed; And then the attack rate was calculated using the following formula: Attack rate = (number of plants attacked and damaged / total number of plants examined) X100.The damage caused by thrips was estimated for the different stages of crop development, he majority of the thrips were foudedin the flowering stage.We observed significant declines in yield, In view of this situation, farmers use unchecked chemical control to stop this threat.

Keywords: *Thrips, damage, pepper, Bejaia.*

CURRENT STATUS OF CITRUS TRISTEZA VIRUS (CTV) AND ITS POTENTIAL APHID'S VECTORS IN CHLEF VALLEY (ALGERIA)

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Abstract

Field observation in citrus orchards in Chlef valley showed many cases of decline and other typical symptoms of tristeza disease mostly in plants grafted on sour orange which is the dominant rootstock in the valley. A survey of *citrus tristeza virus* (CTV) was carried out during the spring of 2016 to evaluate its current situation and to identify the potential aphid's vectors. Total of 1680 samples collected from 93 orchards located in 21 communes were tested by DTBIA/DAS-ELISA. The analyses have confirmed the presence of CTV in 54 samples through the study area on citrus trees of different species, varieties, ages and origins, whereas the inventory of citrus aphids species carried out during the same period highlighted the presence of two important CTV vectors which are *Aphis gossypii* (Glover) and *A spiraecola* (Patch). However, there was no evidence of the presence of the major vector *Toxoptera citricidus* (Kirkaldy).

Keywords: *Citrus, CTV, Aphids, vector, Chlef valley.*

BIOCONTROL OF ACTINOBACTERIA AGAINST STREPTOMYCES SCABIES

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Abstract

The phytopathogenic bacteria affect several vegetable crops. *Streptomyces scabies* is the causal agent of common scab, the toxin involved in this pathology is the thaxtomin A. Among genes encoding this toxin, there is the *nos* gene. The objective of this work was focused on the screening of potential biocontrol agents against *S. scabies*. Thus, six strains of Actinobacteria (*S. griseus* Lac1, *S. rochei* Lac3, *S. anulatus* Pru14, *S. champavatii* Pru16, *Nocardiopsis dassonvillei* Vic8 and *N. alba* Pin10) were isolated from Algerian rhizospheric soil. The evaluation of the antagonist capacity of these strains was tested. The *in planta* antagonism test was conducted on radish seedlings in growth pouches. Root growth was estimated by analysis of data with the Winrhizo software. The promising Lac1 antagonist strain was selected to study its effect on *nos* gene expression (qRT -PCR) and thaxtomin A production (HPLC). The Results of antagonism test against *S. scabies* indicated that Pru16, Vic8 and Lac3 strains showed no inhibitor activity *in vitro*. However, *in planta*, these same stains could reduce the pathogenic effect on radish seedlings, which resulted in the disappearance of necrosis. These strains appear to be PGPR. The Lac1 proved active both *in vitro* and *in planta*. Compared to all isolates, the Lac1 isolate acting by antibiosis showed the most significant antagonism. Also, this isolate had effect on *nos* gene expression and production of thaxtomin A. In addition to the widely studied *Streptomyces* sp., this study showed promising new candidate for biological control belonging to the genus *Nocardiopsis*.

Keywords: *Common scab, biological control, Streptomyces, Nocardiopsis.*

INSECTICIDES FOR THE CONTROL TOBACCO THRIPS (*THRIPS TABACI* LIND.) OF THE COTTON

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Abstract

During 2014-2015, a field experiment has been carried out in the Field crops institute - Chirpan (Bulgaria) in conditions of naturally infected cotton with tobacco thrips (*Thrips tabaci* Lind.) including 4 replications of 10 m^2 for each variant. We investigated insecticides Danadim progress 400 EC (Dimethoate), Sumi alfa 5 EC (Esfenvalerat), Pirinecs 48 EC (Chlorpirifosetil), Deccis 2.5 EC (Deltamethrin), Mospilan 20 SP (Acetamiprid), Lannat 25 WG (Methomyl) and Cohinor 200 SL (Imidacloprid). For successful leading the fight against tobacco thrips, the insecticides that can be used are: Mospilan 20 SP at a dose of 15 g/da, Cohinor 200 SL at a dose of 60 ml/da, Danadim progress 400 EC at a dose of 200 ml/da, Sumi alfa 5 EC at a dose of 50 ml/da, Pirinecs 48 EC at a dose of 100 ml/da, Deccis 2.5 EC at a dose of 50 ml/da and Lannat 25 VG at a dose of 100 g/da. The best duration was observed (within the fourteenth day after the treatment) in the neonicotinoid insecticides Mospilan 20 SP and Cohinor 200 SL. The insecticides Danadim progress 400 EC, Sumi alfa 5 EC, Pirinecs 48 EC, Deccis 2.5 EC and Lannat 25 VG retain their efficacy until the 7^{th} day after the treatment.

Key words: *Cotton, insecticides, Tobacco thrips, efficacy*.

EXPERIMENTAL CONTROL TRIALS ON THE PREVALENCE OF ESCHERICHIA COLI IN RETAIL RAW BEEF

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Abstract

The present study aimed to evaluate the prevalence and contamination level of *E. coli* in retail beef available on the Egyptian market, to investigate the antimicrobial activity of thyme essential oil (EO) against *E. coli* in minced beef, and to detect its effect on sensory quality attributes of minced beef. A total of 120 fresh beef samples from Egyptian butcher's shops were microbiologically screened for *E. coli* screening. The results show that 27 samples (22.5%) were found to be contaminated with *E. coli* strains, represented as follows: O_{26}:H_{11}(3.33%), O_{111}:H_2 (5.83%), O_{44}:H_{18} (0.83%), O_{55}:H_7 (1.67%), O_{86} (0.83%), O_{114}:H_{21} (0.83%), O_{124} (1.67%), O_{125}:H_{21} (3.33%), O_{127}:H_6 (2.5%) and O_{128}:H_2 (0.83%). The antimicrobial activity of thyme (thymus vulgaris) EO against *E. coli* count (cfu/g) in the fresh minced beef were detected by using different concentrations of thyme EO. In our study, non-O157 *E. coli* serogroups may be also a cause of shiga-toxin producing *E. coli* (STEC) illness. Thyme EO has antibacterial activity against *E. coli* at 0.5% concentration. The thyme EO slightly positively affects the sensory quality attributes, such as color, odor, texture and overall acceptability of minced beef. So, thyme EO may help in improving the safety and sensory quality of minced beef. Advanced research may be needed to allow its practical application, and to determine the optimal concentration to overcome its intense aroma.

Keywords: *E. coli, thyme essential oils, beef, minced beef, prevalence.*

A DATE PALM DISEASE CAUSED BY *ACREMONIUM STRICTUM (CEPHALOSPORIUM)* IN SAUDI ARABIA

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Abstract

Acrimonium strictum is reported as a new causal agent of a disease in date palm (*Phoenix dactylefera*) in Saudi Arabia. A study was carried out in Awqaf Al Rajhi Date Palm Research Center- Plant Disease Department – Al Kharj- Al Riyadh Saudi Arabia to assess the pathogenicity caused by *A. strictum* in our date palm. Symptoms and necrosis caused by *A. strictum* in susceptible cultivars showed small brown necrosis streak at midrib of fruit stalk in an early stage. There was increase in number and size as the disease progresses; then extended to the bases of fruit strands due to death of bases and strands wilt, the infection of fruit strand caused drying the fruits and their fall. *A. strictum* attacks the bunches and move quickly inside and out the tissues causing brown necrosis and death of the tissues. The isolation and pathogenicity tests were made two times between 2015 - 2016 in both and identification of the pathogen was done by classic method in Plant pathology research institute, Fungi department. The confirmation of results by Biolog technique and DNA sequence were done. Proper temperature for infection was between 20 -30 ° C and the optimum 25° C. When testing the susceptibility of varieties of infection, more varieties like Medjool, Saqae and Kholas were susceptible to infection and the most resistant to infection were Barhy and Khidri. The best results in the control of the fungus *in vitro* were due to use of Karpendazem followed Topsen $M_{70,}$ at the same time, the worst results were seen with the use of Abredion follwed Karant (Cupper hydroxide).

Keywords: *Acrimonium, date palm, Fruit stalk, Fruit strand, Bunch, Biolog, DNA*

ALLELOPATHIC EFFECTS OF THREE IMPORTANT WEEDS ON GERMINATION AND EARLY GROWTH OF WINTER WHEAT

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Abstract

The aim of this study was to examine the allelopathic potential of three important weed species in cereals: *Papaver rhoeas, Cirsium arvense* and *Convolvulus arvensis* on germination and early growth of winter wheat. Bioassay experiments were made in the laboratory in 2016. The water extracts from air dried and grinded shoots and roots were made in different concentrations (2.5%, 5.0% and 7.5%). Winter wheat seeds were taken into Petri-dishes, treated with 15 ml solutions, and put into thermostat at 20 $^{\circ}$C in the dark. The germination percentage was evaluated and the whole length of primary roots and shoots was measured on the 8th day of the assay. The statistical analysis has been done by using two-factorial analysis of variance (ANOVA). The strongest inhibitory effect of shoot extracts on root length of winter wheat was detected with *Convolvulus arvensis* followed by *Papaver rhoeas*, inversely root extract of these weeds caused stimulatory effect. It was determined that root extracts of examined weeds stimulated the shoot length of wheat. Stimulation increased with concentrations. On the basis of the results, we established that shoot and root extracts of *Papaver rhoeas, Cirsium arvense* and *Convolvulus arvensis* had allelopathic effect on germination and growth of winter wheat seedlings. The allelopathic effect of shoot and root extracts of examined weeds were different. In the experiments we observed both, inhibiting and stimulating effects. The effects were changed by concentrations, and usually the higher concentrations caused the strongest effect.

Keywords: *allelopathy, Papaver rhoeas, Cirsium arvense, Convolvulus arvensis, winter wheat.*

MODEL STUDY TO INVESTIGATE THE TOXIC INTERACTION BETWEEN TEBUCONAZOLE FUNGICIDE AND LEAD ACETATE ON CHICKEN EMBRYOS

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Abstract

The aim of this study was to determine the individual and combined toxic effects of MYSTIC 250 EC fungicide (tebuconazole 250 g/l) and lead acetate on the development of chicken embryos. The chicken eggs were dipped in the solution or emulsion of the test materials for 30 minutes on the first day of incubation (day 0). The applied concentration of lead acetate was 0.01% and of fungicide MYSTIC 250 EC was 0.1%. The chicken embryos were examined on day 19 of incubation by the followings: rate of embryo mortality, body mass, type of developmental anomalies by macroscopic examination. The body mass was evaluated statistically by the one-way ANOVA, the embryo mortality and the developmental anomalies was analysed by Fisher test. The body weight of the embryos in all treated groups applied the test items individually or simultaneously was significantly decreased compared to the control group. The embryo mortality was increased statistically in the embryos treated with lead acetate alone or in combination with MYSTIC 250 EC fungicide. The frequency of developmental abnormalities was sporadic in all treated groups. Our teratogenicity study revealed that, the individual toxic effect of lead acetate and tebuconazole containing fungicide formulation (MYSTIC 250 EC) was embryotoxic but not teratogenic in chicken. Based on the results, there is an addition type toxic interaction between tebuconazole containing MYSTIC 250 EC and lead acetate resulted in increased embryotoxicity due to the concomitant exposure.

Keywords: *Ecotoxicology, Tebuconazole, Toxic interaction, Lead acetate, Chicken embryo*

WHITE CHEESE MICROBIAL PROPERTIES MADE OF INFRA RED PASTEURIZED MILK RIPENED IN POTASSIUM CHLORIDE (KCl) SOLUTION

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Abstract

Nowadays some of the traditional food technologies and formulations are being replaced with new ones. In addition to providing healthy and nutritious food, the new methods have potential to reduce risk factors. Using infrared irradiation heat for milk pasteurization as a technology with the high thermal efficiency can be a good alternative to traditional methods of milk processing. Also by replacing potassium chloride instead of sodium chloride in the formula of the salt water of white cheese, the adverse health effects resulting from the consumption of sodium chloride can be prevented. In this study, by using the infrared radiation heat, raw cow milk prepared of Zanjan University animal husbandry was pasteurized and then white cheese produced from it in 2016. The white cheese was placed in four different formulations of brine containing 1) NaCl: KCl, 10:0 percent 2) NaCl: KCl, 7.5: 2.5 percent, 3) NaCl: KCl, 5:5 percent and 4) NaCl: KCl, 0:10 percent for 21 days at a temperature of 8° C. Then the microbial and characteristics of the cheeses were evaluated. Cheeses produced using two pasteurization methods of classical and infrared irradiation had no significant differences in the coliform, yeast and mold counts. Also a comparison of data means resulting from the analysis of the cheese characteristics show that the changing the formula of the brine had no significant effect on the microbial load.

Key Words: *NaCl, KCl, White Cheese, Brine, Infrared pasteurizing, microbial*

ASPIDIELLA HARTII (COCKERELL 1895) (HEMIPTERA DIASPIDIDAE) ON IGNAME (*DIOSCOREA* SPP.) TUBERS: A NEW PEST INTRODUCED IN EPPO

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Abstract

Trans-border migrating people searching for suitable life condition create in the country of destination new trade fluxes, original foodstuffs being an important part of it. Yam is an important West African cash crop that constitutes about the 50% of root consumption and a cheap source of carbohydrate. Central African people living in South Italy buy the tubers to prepare preferred recipes. *Aspidiella hartii* (Cockerell) infests igname tubers marketed on the local ethnic shop in Bari (South Italy). Adult female scales on tuber bark are brownish, sub-circular and large about 1.2 mm. Ventral shields ("flags") from dead individuals are also abundant. Pest reproduces considerably and covers the tuber during storage. Removal of plant sap shrivels the tubers during their trade, reducing quality, viability and marketability of the product. Severe *A. hartii* infestation of tubers can also inhibit their re-sprouting or kill the plant, in the country of origin. Yam heads dipping in concentrate pyrethroids, or organophosphate insecticide or storage in sawdust, paddy husk or wood ash may help to check the pest, although perhaps not all these control measures are allowed in Europe. The armoured scale also infests *Colocasia* sp. (Taro, Araceae) and *Ipomoea batatas* (L.) Lam. (Sweet potato, Convolvulaceae) causing similar damages. The presence of *A. hartii* host plant in Europe and the possible host-shift of this newly introduced pest to our crops poses the Diaspidid invasion risk for European territories.

Keywords: *Alien invasive pest, armoured scale, cochenille de l'Igname, ubi scale, food security.*

ASSESSMENT OF EXTENSION AGENTS' KNOWLEDGE AND SKILLS REGARDING PEST MANAGEMENT IN KHYBER PAKHTUNKHWA PROVINCE (PAKISTAN)

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Abstract

The research was initiated in Khyber Pakhtunkhwa province of Pakistan to investigate extension agents' knowledge and skills regarding pest management. Key objectives of the study were to know the present levels of their potentials and to judge their interested level of skills and potentials in pest management capabilities needed by Agriculture Extension Officers (AEOs) for their job performance. Respondents were asked to report the self perceived level of expertise possessed by them and the level required for smooth performance regarding pest management measures in the field to sustain agriculture. The present and interested levels of potentials were measured both on Likert scale ranging from 1 to 5 such as "very low" as "1" and "very high" as "5". There were significant differences observed in the agricultural officer's potential for sustaining agriculture regarding age, professional qualification and job experience. Age, professional qualification and job experience have significant association on technical efficiency regarding protection of plants from pests for sustainable agriculture. Moreover, required level in said capability was higher in identification of major field crops' diseases as well as the guidance of farmers for herbicides use against weeds. Trainings of AEOs were required in identification of diseases and insect pests of minor crops along with their causes. Hence it is recommended that AEOs may be trained and well prepared in the mentioned parameters of pest management measures to face challenges in the field of agriculture and can face farming community effectively to raise their living standards by sustaining agriculture for their coming generation.

Key Words: *Assessment, Extension Agents, Knowledge and skills and Pest management.*

EXTRACT VISCOSITY OF FEED INGREDIENTS USED FOR EVALUATION OF ANTINUTRITIONAL PROPERTIES

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Abstract

The antinutritive effect of soluble non-starch polysaccharides (NSPs) in monogastric animals is mainly associated with their physiological effects on the digestive medium due to their viscous nature. Soluble NSPs increase the viscosity in the small intestine, hampering the digestion process. Insoluble NSPs impede the access of endogenous enzymes to their substrates by physical entrapping. Extract viscosity values of grains could be used as predictors of anti-nutritional properties of NSP in cereals. The study had in view the effect of the extraction conditions and the soluble NSP concentration of the feed water extracts on the dynamic viscosity (DV). The experiments were carried out on samples of forage mixtures with different structures, and different proportions of wheat (WF1 and WF2) and barley (BF1 and BF2). The water-soluble fraction was obtained using a single extraction at a ratio 1:2 (w/v), with (procedure 1) and without (procedure 2) endogenous enzyme inactivation. DV in wheat containing feeds is lower than those in barley containing feeds. The viscosity values of the water extracts obtained after endogenous enzymes inactivation are higher than those obtained without enzymes inactivation, when the soluble NSPs were hydrolyzed and consequently their molecular mass reduced. Higher correlation between dynamic viscosity and cereal content in the feed was observed in procedure 1: r = 0.9877 for BF1, r = 0,9885 for BF2, r = 0.9827 for WF1 and r = 0.9887 for WF2 as compared to procedure 2: r = 0.9849 for BF1, r = 0.9348 for BF2, r = 0.8474 for WF1 and 0.9454 for WF2.

Keywords: *non-starch polysaccharides, dynamic viscosity, wheat, barley.*

EFFECT OF DRY HEAT TREATMENT ON THE DIETARY FIBER IN BARLEY

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Abstract

Cereal grains are major sources of dietary fiber (DF), an important component of food and an important contributor to human health. Based on their water solubility DF is classified as soluble dietary fiber (SDF) and insoluble dietary fiber (IDF). Barley contains substantial amounts of both SDF and IDF. The predominant water SDF in barley is β-glucan (7.6%). Soluble dietary fibers, such as β-glucans, lower blood cholesterol and glucose concentrations partly because of their capacity to increase the viscosity of intestinal chime. Soluble polysaccharides give viscous aqueous solutions. The physical and physiological properties of β-glucans are of commercial and nutritional importance. Food processing is mostly based on heating. Heat treatment alters the properties of plant cell wall and modifies the composition and solubility of fibers, which modifies the water extract viscosity (WEV). The experiments had in view the effect of dry heat treatment (in forced air oven, and microwave oven) **on the** SDF fraction in barley, revealed by determination of WEV. The experimental data revealed that thermal processing has a marked effect on the viscosity of SDF. Heat treatment increased WEV and also demonstrated that the proportion of SDF in the total DF content of the cooked flour increased with cooking time. A redistribution of the total DF content from insoluble to soluble components occurs. An increase in WEV of 73% occurred when heating at 150ºC for 10 minutes, and of 56% when heating at 180ºC for 5 minutes. When heating 90 seconds in microwave, WEV increased with 41%. Further heating (120 seconds) decreased WEV.

Keywords: *dietary fiber, barley, β-glucan, water extract viscosity, heat treatment.*

OBSERVATIONS ON FLIGHT DYNAMICS OF THE LEAF MINING MOTH - *CAMERARIA OHRIDELLA* DESCHKA & DIMIC IN 2014-2015

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Abstract

The chestnut moth leaf miner, *Cameraria ohridella* Deschka & Dimic represents in the Huși area a dangerous pest, which outbreaks causing damages every year. In this paper flight dynamics the butterflies followed traps type Atra-CAM. The butterflies flight situation is as follows: In 2015 the flight of hibernate generation butterflies started on 8.05, and it is finished on 21.05. The maximum flight curve was recorded on 21.05 when they were captured a total of 389 samples; The flight of the first-generation butterflies has started on the 21.06, and he concluded on 31.07. The maximum flight curve was recorded on 30.06 when they were captured a total of 410 samples; The flight of the second-generation butterflies started on 1.08, and it's concluded on 3.09. The maximum flight curve was recorded on 15.08 when they were captured a total of 400 samples. In 2016 the flight of hibernate generation butterflies began in May, on 09.05, and he finished on on 21.06. The maximum flight curve was recorded on 31.05 when they were captured a total of 380 samples; The flight of first generation butterflies has started on the 26.06, and he finished on on 31.07. The maximum flight curve was recorded on 13.07 when they were captured a total of 290 samples; The flight of second generation butterflies started on 3.08, and he finished on on 15.09. The maximum flight curve was recorded on 15.08 when they were captured a total of 400 samples.

Keywords: *flight of butterflies, dynamic, traps, AtraCam.*

EFFECT OF EPIN EXTRA REGULATOR ON DEVELOPMENT OF BARLEY GROWING ON Cd-CONTAMINATED SOIL

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Abstract

Chemical plant protection products, in particular herbicides, whose action can be considered as a kind of stress for the plants, can have a depressive effect on culture. The use of plant growth regulators in the cultivation of grain crops is aimed to obtain agricultural products with a minimum content of toxic and hazardous substances and improving the environmental situation. A presowing treatment of barley seeds, Elf variety, by the growth regulator Epin extra, when herbicide Agritox used for the crop cultivation, significantly increases the root index of plants both growing on soils with the background and increased Cd concentrations. At the same time the using of the growth regulator does not reduce a depressive effect of the herbicide on the photosynthetic activity of 30-day plants. The presence of Cd in soil in high concentration does not significantly affect the accumulation of K and Ca by 30-day plants, and at the same time increases the Mg content in plants. Using of herbicide Agritox leads to a decrease in the productivity of barley varietie Elf on 9-13% when plants grow on soil with the background concentrations of Cd. The shortage of the crop is due to a decrease in the number of grains and their mass in the lateral shoots. High content of Cd ions in soils reduces negative effect of herbicide Agritox. Using plant growth regulator Epin extra does not lead to significant changes in the yields of barley of Elf variety.

Keywords: G*rowth regulator, Epin extra, Development of barley, Cadmium, Herbicide.*

EFFECTIVENESS OF *PSEUDOMONAS CHLORORAPHIS* K24 AGAINST *RHIZOCTONIA ZEAE* ISOLATED FROM CORIANDER SEEDS

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Abstract

Coriander (*Coriandrum sativum* L.) is an annual herb that belongs to the *Apiaceae* family. This herb is used for treating various diseases and disorders in the folk medicine over the century. The ripe fruits have a distinctive sweet citrus-mint aroma and have been valued as a spice. Rhizoctonia *sp. is a* plant-pathogenic fungus which attacks a wide range of crop and aromatic plants, including coriander. Rhizoctonia persists in the soil in a form of resistant sclerotia. *R. solani* causes damping-off disease on coriander; seeds and seedlings are particularly susceptible to this fungus. The aim of this study was to test various *Pseudomonas* strains and their extracellular products on the growth of phytopatogenic fungi isolated from coriander seeds and to evaluate several strains as potential biocontrol agents. *Rhizoctonia zeae* was isolated from infected seeds and characterized based on macroscopic and microscopic morphology. Among 142 strains of *Pseudomonas* spp., only 11 showed inhibition of fungal growth. *P. chlororaphis* strain K24 was the most effective, showing the fungal growth inhibition in all tested fraction: 65.86% for cell culture (10^6 CFUml^{-1}), 57.77% for cell-free supernatant (CFS), 55.77% for CFS-EDTA and 50.48% for thermo-stable fraction of cell-free supernatant. Because of its strong inhibition activity toward *Rhizoctonia zeae, P. chlororaphis* strain K24 can be used in seeds treatment to enable fungi-clean seeds and to prevent the introduction of the disease into new fields.

Keywords: *Coriandrum sativum* L., *seed infection, Rhizoctonia zeae, Pseudomonas chlororaphis, antifungal activity.*

EFFECTS OF SULFONYLUREA HERBICIDES ON INORGANIC PHOSPHORUS IN MAIZE LINES

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Abstract

Knowledge about maize inbred lines response to herbicides could give large advantage in weed control and avoid potential problems with low selectivity in field production. In general, herbicides have lower selectivity to maize inbred lines, when compared to hybrids. Response of seven maize inbred lines to sulfonylurea herbicides was evaluated in two years field experiment. Years differed, accordingly to meteorological parameters. Two sulfonylurea herbicides - nicosulfuron and foramsulfuron were applied in stage 15-16 (BBCH scale). Herbicides were applied in recommended dose for use in hybrid maize and in double dose. Herbicides did not caused significant visual damages to tested lines (2-3 weeks after treatments), only slight symptoms occurred, typical for applied herbicides, with complete plant recovering observed in second visual evaluation (2-3 weeks after the first). Only in several cases, applied herbicides, mainly foramsulfuron influenced grain yield decrease, especially when it was applied in double dose. On the other hand, according to the regression analyses, significant dependence between inorganic phosphorus content (samples 48 h after treatments) and grain yield were observed in four lines, what can be one of detoxification, i.e. tolerance reactions to herbicide application.

Key words: *herbicides, maize lines, grain yield, inorganic phosphorus*

FIRST REPORT OF THE NATURAL OCCURRENCE OF THE TELEOMORPH OF *LEPTOSPHAERIA MACULANS* ON OILSEED RAPE IN SERBIA

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Abstract

Leptosphaeria maculans (anamorph *Phoma lingam*) causes blackleg disease of oilseed rape. The teleomorph stage of the blackleg pathogen on oilseed rape in Serbia has been reported for the first time. Plant remains of oilseed rape, with clear symptoms of disease were collected in the locality Crvenka brought to the Institute of Field and Vegetable Crops and placed on the soil surface. Immediately, in the vicinity of plant remains, Burkards spore catcher (Burkard Manufacturing Co.Ltd) was placed. Due to the lack of precipitation during October, the stem was sprayed with water (3 to 5 mm/m^2) every 2 to 3 days. Microscopic examination of tape from Burkards spore catcher was carried out every 7 days. This paper studied the morphological characteristics of pseudothecia, asci and ascospores (size, shape, color and structure). In addition to morphological characteristics, pathogenic properties were investigated by applying a suspension of 10^5 ascospores in the cotyledons. Based on the conducted tests, the presence of a teleomorph stage of fungi *Leptosphaeria maculans* in Serbia was determined.

Key words: *ascospore, Leptosphaeria maculans, pseudothecia, morphological characteristics.*

ESSENTIAL OILS AS AN ALTERNATIVE BACTERICIDES AGAINST SOFT-ROT BACTERIA, *PECTOBACTERIUM CAROTOVORUM* SUBSP. *CAROTOVORUM*

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Abstract

Bacterial soft-rot disease caused by *Pectobacterium carotovorum* subsp. *carotovorum* is a very destructive disease with a diverse host range in agricultural crops, during the plant growth in the field and in storage. Control, usually based on the use of chemical products, is not satisfactory because of their harmful effect on human health and environment, as well as the possibility for pathogen resistance development. Therefore, developing of new natural products (such as essential oils-EOs, plant extracts etc.) with a sufficient efficacy in control of the disease was imposed. The current study included *in vitro* testing of bactericidal activity of 51 different oils against *P. c.* subsp. *carotovorum*, using an agar-diffusion assay. Bacterial suspension was mixed in Nutrient Agar to final concentration of 10^7-10^8 cells/mL and poured in sterilized Petri plates (ø 90 mm). After media solidified, sterile filter paper discs (ø 5 mm) were placed on the surface of the Petri plates and supplemented with 20 μL of each tested oils. The experiment was performed in a completely randomized design. The results were expressed as a width of inhibition zone (mm) and analyzed by one-factor analysis of variance by using the software package Statistica 7.0 (StatSoft, Inc.). Results showed that the 7 most efficient EOs against *P. c.* subsp. *carotovorum* (*Thymus vulgaris*, *Cinnamomum cassia*, *Cassia angustifolia, Origanum vulgare, Boswellia serrata, Eucalyptus globulus, Satureja montana*, respectively) achieved inhibition zone greater than 20 mm. Inhibition zones in the range of 15-20 mm were achieved by 8, 10-15 mm by 9, and less than 10 mm by 6 EOs. The rest of 21 Eos did not show any bactericidal effect.

Keywords: *in vitro, bacteria, inhibition, essential oils.*

PROTEIN CONTENT AND TOTAL AMINO ACID PROFILE OF THE MUSCLE AND SKIN OF THE EUROPEAN EEL (*ANGUILLA ANGUILLA*)

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Abstract

The European eel (*Anguilla anguilla*) is of great commercial importance in Spain and Portugal, as part of their traditional gastronomy. However, it can also be found in different European areas, from Norway to the Mediterranean coast. The protein content of fish can change according to the species, sex, age, nutritional status, season, among others. Protein provides nitrogen and amino acids necessary for the synthesis of new proteins and other important compounds. In any case, fish is considered a good source of high-quality protein. This quality is measured as a function of the proportion of essential amino acids that form them. Several authors write about amino acid profiles of different species. However, there are not enough data about the nutritional value of eels. The aim of this work was to determine the amino acid composition in the muscle and skin of the European eel. All samples weighed between 10 to 100 g. The head and the thorn were removed. The skin and muscle were used to measure the protein content and amino acid profile. The protein content was assessed by the Kjeldahl procedure, and the total amino acids were determined according to Franco *et al.* (2010). Significant differences ($P < 0.001$) were found in the protein content between the muscle and the skin (19.54 ± 0.54 % and 23.42 ± 1.50 %, respectively). The major essential amino acid in both the muscle and skin was leucine. The major non-essential amino acids in the muscle and the skin were glutamic acid and glycine, respectively, and the minor amino acids were proline and methionine.

Key words: *Food composition, European eel, Protein, Amino acid profile, Nutritional value.*

DETERMINATION OF FOOD PURCHASING PREFERENCES OF CONSUMERS USING ROBUST FACTOR ANALYSIS

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Abstract

In this study, it was aimed at applying robust factor analysis for an ordinal five-point likert scale data obtained via a questionnaire applied to 385 consumers selected via simple sampling method in Igdir province located in Eastern Anatolia Region of Turkey. As a factor extraction method, Robust Unweighted Least Squares (RULS) was specified together with promin rotation method. Within the scope of explanatory factor analysis, 'FACTOR' software was specified as a remarkable tool in the determination of ideal number of factors and unnecessary items in the EFA analysis. Since use of Pearson correlations are not an advisable option in the violation of the assumption regarding univariate normal distribution of the ordinal variables in the 'FACTOR' software, polychoric correlation was adopted for the likert scale data analysis under investigation. All 29 items prepared on food purchasing preferences of consumers in the present study were included in the EFA analysis within the scope of RULS method. Asymptotic covariance/variance matrix was estimated by bootstrap sampling. Advised number of factors was found to be five. These factors are good reputation of the shop and experience (Factor 1), ease of purchasing (Factor 2), price and properties of product (Factor 3), qualified products (Factor 4) and promotion elements (Factor 5), respectively. Result of Kaiser-Meyer-Olkin (KMO) test was estimated as 0.74. Bartlett statistic was found to be 2541 (P=0.00001). Bias-corrected bootstrap 95% confidence interval for KMO test was found between 0.739 and 0.758. Root Mean Square of Residuals (RMSR=0.0471) was found lower compared with an expected mean value of RMSR estimated based on Kelley`s criterion (0.0510). It was concluded that use of 'FACTOR' software was much more informative and reliable for the ordinal data. Moreover, food sellers and entrepreneurs who aim to improve marketing strategies might be advised to consider the aforementioned five factors that affect food purchasing preferences of the consumers.

Keywords: *Robust Unweighted Least Squares, Ordinal data, EFA, Bootstrapping, purchasing preferences.*

IMPACT OF THREE DIET REGIMES ON BIOLOGICAL PARAMETERS OF ECTOMYELOIS CERATONIAE

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Abstract

Carob moth *Ectomyelois ceratoniae* Zeller control requires knowledge of biological parameters in relation with different diets; these data will represent a fundamental tool allowing mechanisms interpretation of variation in abundance of this pest. The biological parameters of *E. ceratoniae* were studied in a controlled breeding chamber within a temperature of 27 ± 2 ° C, relative humidity of 65 ± 10% and a photoperiod of 16 hours light and 8 hours of darkness on the dates of Deglet Noor, Mech Degla and Ghars varieties. The results showed that the net reproductive rate (R_0), intrinsic rate of increase (rm) and the finite rate of increase (λ) of the carob moth on the three considered varieties dates are significantly different. These latest parameters were lower on the dates of Mech Degla and Ghars and higher on Deglet Noor (respectively 29.05 ± 6.84, 0.162 ± 0.05 and 1.18 ± 0.05). The mean generation time (T) and the doubling time (DT) were significantly longer on the dates of Mech Degla with respectively, 32.66 ± 7.74 and 8.37 ± 1.35 days. On the contrary of fecundity rate and fertility, the development duration of various stages of *E. ceratoniae* showed highly significant differences where, the longest time was recorded in individuals fed by Ghars dates. Our results showed that the fruit nutritional quality of the three varieties influence greatly on the development and the growth of *Ectomyelois ceratoniae.*

Keywords: *Ectomyelois ceratoniae, date, development, growth, reproduction*

MORPHOLOGICAL AND MOLECULAR IDENTIFICATION OF *FUSARIUM* spp. CAUSING DISEASES IN STRAWBERRY

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Abstract

Soil-born fungal diseases cause significant losses in strawberry culture and *Fusarium* is one of the most important among them. The present study was conducted to investigate *Fusarium* species causing wilting in strawberry plants. Morphological and molecular detection of different *Fusarium* species related to wilting diseases in strawberries was objective of the study. The fungal isolates were collected from the main strawberry growing areas in Anamur and Silifke districts of Mersin province, Gazipaşa and Aydıncık districts of Antalya province, and Sultanhisar district of Afyon province. Total of 300 samples were analyzed morphologically and 39% of them found infected with *Fusarium* species. The pathogenicity of six morphologically distinct *Fusarium* isolates were tested utilizing root dipping to spore suspension method using strawberry variety ‘‘Festival’’. After pathogenicity tests, total DNA from mycelial cultures of six *Fusarium* isolates were extracted and ribosomal DNA ITS region was amplified using ITS6/4 primers by PCR. The amplicons were sequenced and obtained DNA sequences were blasted in NCBI and Fusarium ID GeneBanks. The sequences of all morphologically identified *Fusarium* isolates showed 99-100% identity with the *Fusarium* species deposited in NCBI. Furthermore, the investigated *Fusarium* species were identified as *Fusarium oxysporum,* and *F. proliferatum* according to NCBI but *F. incarnatum-equiseti* species complex and *F. concolor* according to Fusarium ID.

Key words: *Fusarium spp., ITS, Molecular diagnosis, Pathogenicity, PCR, Strawberry.*

CONTROL OF A PROBLEMATIC WEED IN ROMANIA *SORGHUM HALEPENSE* FROM MAIZE CROPS

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Abstract

Romania has one of the highest degrees of infestation with *Sorghum halepense* because this weed is a thermophilic and heliophilous species. It found satisfactory growth and development conditions due to the high fertility of soils, especially under the conditions of substantial underground water intake. Maize is one of the very sensitive crop plants to infestation with *Sorgum halepense* especially in the early stages of development. The only effective way to control this weed is to use selective herbicides for maize crops having aggressive action on this weed. The aim of this study was the control of *Sorghum halepense* from seeds and rhizomes by post-emergence application of nicosulphuron-based herbicides in various doses and different development stages of weeds in maize crop. The experiments were carried out in Afumati farm, Ilfov County, in two years 2015 and 2016, and they were placed in randomized blocks and the observations targeted the degree of effectiveness in controlling weeds and crop selectivity. The herbicides based on nicosulphuron had a good efficacy in controlling *Sorghum halepense* in maize crops. At the dose of 1.0 Lha^{-1} this weed was not fully controlled, in conditions of strong infestation. The best results were obtained at the dose of 1.5 Lha^{-1} applied in sequential treatments. Also, no phytotoxic symptoms were shown in experimental fields.

Keywords*: control, herbicide, nicosulphuron, weeds.*

YIELDS AND PATOGENS OF NEW VARIETIES OF BARLEY AND WHEAT DURING 2016 IN DOBROGEA REGION OF ROMANIA

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Abstract

The paper aimed to present the main pathogens of two-rowed barley and wheat crops and the yields obtained in 2016 at S.C. SPORT AGRA SRL Amzacea, Constanța district (Romania) on demonstrative plots. Climatic conditions of autumn 2015 and spring 2016 provided a favorable development of the crops. Protection against foliar diseases of the two grain crops was done using three fungicides treatments with Bumper 250 EC, Artea 330 EC and Prosaro 250 EC, no attack of powdery mildew (*Blumeria graminis*) was registered. The attack of *Rhyncosporium secalis* and *Pyrenophora tritici-repentis* in two-rowed barley presented a low level. On wheat, the pathogens *Septoria tritici* and *Pyrenophora tritici-repentis* had low attack levels, except the cultivars Hybiza, Hylux and Avenue with higher attack. The pathogen *Puccinia striiformis* had the lowest values of attack, except the variety Avenue and Pescador. Concerning the correlation between the yields and the pathogens incidence and severity, the lowest yields in wheat crop were obtained with Hybiza (4740 kg/ha) and Avenue varieties (4860 kg/ha). The highest yields were obtained with Genius (8401 kg/ha) and Katarina varieties (8400 kg/ha). For two-rowed barley crop, the lowest yield was 8450 kg/ha for Wendy variety and the best yields were 8800 kg/ha for Henriette variety. Quality indices of wheat grains were between 74.6 for Hylux variety and 81.0% hectoliter mass for WinterGold variety.

Key words: *yield, pathogen status, barley varieties, wheat varieties, Dobrogea region, Romania*

EFFECT OF DRYING MODE ON THE CHANGES OF VIRGINIA TOBACCO TYPE CHEMICAL COMPOSITION

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Abstract

Virginia type of tobacco is used in the highest percentage in the mixture for making cigarettes. Important factors for the formation of quality features of Virginia are environmental conditions of manufacturing but preferably the well regulated drying process. Drying of these tobacco types is performed in special dryers with controlled conditions (flue curing-FC). Since the price of energy source for drying process participate the greatest deal in total expenses during the production and processing of tobacco, the scope of the experiment was to determine the possibilities of drying tobacco in a natural condition (air curing-AC). Material for research the first-class middle leaves of Virginia tobacco type, variety Heveshi - 9, were produced in Vojvodina area (Srem - Maradik), vintage 2015. The experimental results showed that the way of drying affects the appearance and color of leaves, chemical characteristics of tobacco and duration of the drying process. Considerable differences of chemical composition between flue curing and air curing tobacco were found as follows (% in dry matter): 2.03 and 2.25 (nicotine), 1.80 and 2.73 (total N), 0.87 and 2.06 (protein N), 5.46 and 6.60 (total proteins), 19.39 and 1.96 (reducing sugars), 11.61 and 15.43 (ash), 1.48 and 8.91 (sand), 5.19 and 5.92 (pH), respectively. The leaves dried in natural condition (AC) had dark color (dark Virginia) and rough nervature. Although drying in a natural condition brings cost savings in energy, the process is longer by 24 days comparing to flue curing.

Keywords: *drying, flue-curing (FC), air curing (AC), Virginia, chemical composition*

EFFECT OF CASING AND TOASTING REGIME ON BURLEY TOBACCO TYPE COMPOSITION

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Abstract

Tobacco leaf contains more than 3000 compounds that influence the quality of tobacco. The total content of all the constituents of tobacco leaves, and their mutual interactions affects the quality of the cigarettes, as a final product. Addition of sauces made from sugar either fruit components can change the chemical composition of tobacco, with the appropriate temperature regime in order to improve quality. The scope of this study was to examine the effect of casing (sauce application), and toasting regime to the chemical composition of the Burley tobacco, originating from Macedonia. Five groups of samples were made, which were toasted under the different regimes (temperature, time of toasting and thickness of the layer of tobacco). The variations of the chemical composition within the group were followed and compared with a control sample that was not submitted to the process of casing neither toasting. Casing and toasting affected the change of chemical composition of tobacco in terms of increasing the content of moisture, soluble sugars, reducing the content of nicotine and nitrogen compounds as well as decreasing of the total protein levels. Changes in ash content and pH values have no linear character and depend on heating treatment. Changes of any parameter during the toasting process result in changing of the chemical composition of tobacco. They are most pronounced when the toasting of tobacco is carried at lower temperature, but in prolonged time in the toaster, in a thin layer of tobacco.

Key words: *Burley tobacco, moisture content, soluble sugars, nicotine, nitrogen compounds*

PLANT PATHOGENIC FUNGI CAUSERS: FUNGAL DISEASES OF THE HAIRY VETCH IN SERBIA

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Abstract

(*Vicia villosa Roth*.), is a vining, winter-active legume. It may be annual or biennial. Hairy vetch is a widely grown forage crop, although outside cultivation it is often considered to be a weed. It belongs in the legume family, Leguminosae (also known as *Fabaceae*). Hairy vetch is very similar to tufted vetch (*Vicia cracca*), the most noticeable difference being that tufted vetch has a smooth stem. It is a legume, grown as a forage crop, fodder crop, cover crop, and green manure. Diseases caused by phytopathogenic fungi every year have a significant impact on yields and quality of the final product to a greater or lesser degree. They can also affect trade plant material and cause the expansion of the disease in new areas where legumes are grown. There has not been a systematic research of hairy vetch mycoflora in Serbia. This research aims to present the results of preliminary research of mycopopulation of 15 different genotypes of hairy vetch. Total of 600 plant parts have been analyzed and 7 genera of fungi are isolated: Fusarium, Phythophthora, Rhizoctonia, Phoma, Verticillium, Sclerotinia and Botrytis. On plants from which the fungi were isolated, there were macroscopically clearly visible symptoms of infection. Symptoms in the form of color changes on stems and lateral branches have been identified.

Key words: *phytopathogenic fungi, hairy vetch, Serbia*

POSSIBILITY OF DRYING BURLEY TOBACCO TYPE IN A SOLAR DRYER

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Abstract

The aim of this experiment was to determine the possibility of drying Burley tobacco type in a solar drier, monitoring the parameters of the drying process and determination of the physical, chemical and sensory characteristics of tobacco. As a material we used Burley tobacco, the lower middle leaves from the production areas of Šabac (Serbia), vintage 2013. Drying was carried out in a solar passive-active drier F-1 at the Faculty of Agriculture, University of Belgrade. The results represent that drying was 16 days shorter comparing to the standard process of air curing Burley tobacco type. It has been found that the physical, chemical and sensory properties of the solar dried tobacco differ in relation to standard Burley. In general, the increase of equilibrium moisture content and quantity of soluble sugars, pH reduction, reduction of nitrogen components and ash quantity can be marked as a positive results. Such tobacco, due to acidic reaction, will be more pleasant to smoke compared to standard air curing Burley. In contrast, increasing the thickness of the leaf, the specific mass and the body fullness is a negative outcome, because such tobacco has worse cutting properties, lower filling power during cigarette making, which all result in an increased amount of smoke. According to the criteria for classification of Burley tobacco, and sensorial characteristics it is classified in third quality group. Burley tobacco type obtained in the experiment described could find its use in cigarettes blends, which opens up opportunities for further research.

Keywords: *solar dryer, Burley tobacco, chemical properties, physical properties, sensory properties*

TOTAL BETA ACTIVITY, POTASSIUM-40 ACTIVITY AND RESIDUAL BETA ACTIVITY IN DIFFERENT CORN-BASED FOOD SAMPLES

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Abstract

The use of nuclear energy to peaceful purposes causes contamination of the environment with radionuclides. Therefore, the monitoring of radionuclide levels in the environment in certain region is of vital importance because it creates a basis for providing radiation safety of human population. In this article, basic radiation data such as total beta activity (TbA), potassium-40 activity ($A^{40}K$) and residual beta activity (RbA) in corn-based food samples from different shops in Novi Sad have been measured. Corn-based food plays an important role in traditional Serbian diet and is also very attractive in modern dietary trends. The products, which are most commonly used for human consumption, were selected for the analysis. During spring 2016, the samples of different corn products available on the market in Novi Sad were collected by random selection. In this study, 26 samples in original packaging were collected from the supermarkets. All samples originated from Serbia. The following sample types have been collected: white and yellow corn flour, corn grits, polenta, corn flakes, corn for popcorn, popcorn and corn snacks. Total beta activity was determined from the mineral rest after burning dried samples by the anticoincidental device for measuring low-beta activity, type Omni-Guard (USA). The content of potassium in the samples was determined using atomic absorption spectrometry. Total beta activity ranged from 35.8±1.9 Bq/kg to 224.7±5.4 Bq/kg, and residual beta activity from 4.9–34.8 Bq/kg. Measuring of TbA and potassium-40 activity can serve as a first phase of radiation-hygienic control.

Key words: *corn-based food, total beta activity, potassium-40 activity, residual beta activity*

A BIOCHEMICAL AND THERMO-RHEOLOGICAL ANALYSIS OF SPANISH ARTISAN CHEESE

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Abstract

Spain has a long cheese making tradition and a wide variety of traditional cow, goat and ewe cheeses. The dairy sector is strategic in the Spanish agri-food industry due to its economic relevance and its contribution to the development of the rural population. Afuega'l Pitu is a popular artisan cheese from Asturias (northern Spain) protected with PDO (Protected Designation of Origin) since 2004. It is made with pasteurized milk from Friesian and Asturian Valley breeds, and their crosses, fed by traditional diet. The aim of this study was to analyze biochemical and thermo-rheological characteristics of *Roxu* variety of Afuega'l Pitu ripened for 30 days. Eight batches (R1-R8) of PDO cheesemakers were studied. From stress sweeps at 1Hz and 20°C, the highest significant differences in stress (σ_{max}) and strain (γ_{max}) amplitude values were between R5 and R8 (σ_{max}=885±89 *vs* 177±18 Pa; γ_{max}=0.283±0.035 *vs* 0.347±0.022%), respectively. This could be explained based on the moisture-protein ratio (MPR), being the lowest for R5, resulting in a more brittle network due to a greater casein packing, and the highest for R8, producing a weaker and more deformable casein gel. Thermal profiles, obtained using dynamic thermo-mechanical analysis, showed casein matrices with a solid-like character (*G' >G''*) from 20 to 90ºC. Specifically, from T>60ºC *tanδ* decreased with increasing temperature for all samples, showing a specific heat-induced gelation, compatible with the softening of cheeses at high temperature.

Key words: *Compositional parameters, Thermo-rheological properties, Afuega'l Pitu cheese, Spain.*

EXPERIMENTAL MANUFACTURING OF KOURDASS, A TRADITIONAL SALTED DRIED MEAT PRODUCT

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Abstract

Among the most commonly consumed meat in the Morocco, lamb meat plays an important role as both a fresh or like a processed product. Kourdass is a traditional meat product made with lamb intestines, liver, lung and fat. The meat is sliced, salted, spiced and coated in the rumen before exposed to the sun for drying. Currently, a lot of works show the quality of several dried meat products through the studying of different parameters, such as the amine content. These compounds are produced naturally by animal, plant and microorganism metabolism. Furthermore, there are not enough data about kourdass. The aim of this work was to study changes in the content of biogenic amines during the ripening of kourdass. Trials of kourdass-making were carried out in a laboratory with a traditional procedure. Batches of six kilograms, each containing fresh sheep meat, were purchased directly from a slaughterhouse. The batches were sampled at different times to follow up the modifications in the amine contents. During ripening, the total amine content increased significantly ($P < 0.05$). The results indicated that spermine and tyramine were the most abundant biogenic amines in the fresh meat. Together with tryptamine, these compounds make up the majority at the end of the manufacturing process. Histamine and agmatine levels remained very low throughout repining, and exhibited no quantitatively relevant changes. Total content of biogenic amines was 101.72 mg/kg. It is low in comparison with other meat products. In conclusion biogenic amines quantification indicates the hygienic quality of manufacturing processes.

Key words: *Lamb meat, Biogenic amines, Kourdass, Food quality.*

ASSESSMENT OF METALS IN SOME WILD EDIBLE MUSHROOMS COLLECTED FROM TURKEY

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Abstract

Wild-growing fungi have been considered as a delicious food in many countries for a long time. However, some of them can accumulate large concentrations of heavy metals, which can be dangerous to human health particularly, when the intake is high. Thanks to the climatic conditions, Turkey has also a great potential for wild edible mushroom species and several species have been consumed especially in rural areas. In this study, 13 different metals (Mg, Al, Ca, Cr, Mn, Fe, Co, Ni, Cu, Zn, As, Se, Cd) and 3 isotopes of Pb (^{206}Pb, ^{207}Pb and ^{208}Pb) contents in two different wild-growing edible mushroom species (*Hydum rufescens*, *Macrolepiota procera*) collected from Kastamonu forest in October of 2014, in Turkey were investigated. Mushroom samples were analyzed by inductively coupled plasma mass spectrometry (ICP-MS, A Bruker 820-MS). The results showed that metal contents in *Macrolepiota procera* were higher than the metal contents in *Hydum rufescens* except Al and Mn. All of the toxic element concentrations (Cr, Cd, As) were low and below the world average in both mushroom species. Consequently, there was no any health risk associated with consumption of the analyzed wild edible mushroom species.

Keywords: *Metal, wild edible mushroom, Turkey.*

PROSPECTIVE USE OF BACTERIOPHAGES AS AGENTS TO COMBAT PHYTOPATHOGENIC BACTERIA OF POTATOES

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Abstract

Plant diseases caused by bacteria are a serious problem in the cultivation and storage of agricultural products. During the last years bacteriophages have attracted increased research interest as a realistic environmentally friendly means for controlling bacterial diseases. The main objective of the study was to characterize the bacteriophages that could be used in the search for and developing the antimicrobial agents based on bacterial viruses. Four isolates of bacteriophages specific to bacteria from *Pseudomonas* genus were isolated from potato samples with typical symptoms of bacterial disease. These phage isolates differed in terms of the morphology of their negative colonies. Slight variation in the morphology of studied phages was observed using electron microscopy. A group of phages was identified as *Podoviridae* family of *Caudovirales* order (icosahedral head without long tail, small size – head diameter 43 ± 1 nm, tail length 1 ± 0,5 nm). To identify host range/specificity of isolated phages, we analyzed the spectrum of lytic activity against 15 strains of phytopathogenic bacteria. Our research revealed that among four phage samples three expressed lytic activity against different strains of phytopathogenic bacteria. The aforementioned data enable us to conclude that these three isolates with broad spectrum of lytic activity can be used as perspective biologic agents in control of bacteriosis. Thereby phages from our collection could be of therapeutic interest, they have the potential to be used in future prospects for phage therapy research.

Keywords: *bacteriophage, bacteriosis, biocontrol, potato.*

CONTROL FOREVENT 176 GM CONSTRUCTS AT SIX CULTIVARS OF MAIZE (*ZEA MAYS* L.) IN USE IN ALBANIA

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Abstract

Maize is among the import crops in use in Albania, which is produced and imported for internal use in food and feed. Our research addressed the first control in the country for the GM constructs at six maize cultivars related to Event 176. We used at first primers for the zein gene and Cauliflower Mosaic virus 35 spromoter, and then primers for pollen-specific calcium dependent protein kinase (CDPK) promoter from maize, and primers for delta endotoxin from *Bacillus thuringiensis subs. kurstaki* CryIA(b). Results show that all samples could amplify the maize zein gene fragment, and 4 of them were found to amplify the 35CaMV promoter. DNA samples from cultivars of the last category were used to amplify the CDPK and CryIA(b) fragments. Results show that from 4 out of six cultivars were amplified the expected products. In conclusion, in trade in the country there are a number of GMO maize cultivars, which should be labelled as such.

Keywords: *GMOs, genetic constructs, CaMV promoter, Cry proteins.*

ANTIFUNGAL ACIVITY OF ESSENTIAL OILS AGAINST POST-HARVESTWHEAT PATHOGENOF *ASPERGILLUS SP*.

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Abstract

The aim of this study is to evaluate the effectiveness of three essential oils of *Cedrusatlantica* M., *Pistacialentiscus* L. and *Ammoïdespusilla* Brot., against *Aspergillus sp* under *in-vitro* conditions.This pathogen was isolated from durum wheat (*var. Boussalam*) in different culture middle of PDA, CDA and PDAac. Essential oils were applied in 3 levels, including 0 (as control), 10 and 20 µl. The antifungal activities of these essential oils were evaluated by disc diffusion method on PDA medium. The results showed that four species (*A.fumigatus*, *A.ochraceus*, *A.flavus* and *A.niger*) were identified. The contamination on PDA mediumhas been dominated by the specie*A.flavus*, with $4.56x10^2$ UF/g,as well as on CDA and PDAac with 2.93 $x10^2$UF/g and 2.46 $x10^2$ UF/g, respectively. Furthermore, the average extraction yields ofessential oils of *C.atlantica* M., *P.lentiscus* L. and *A.pusilla* Brot., were 1.62%, 0.32% and0.05%, respectively. The susceptibility of durum wheat pathogens showed that the essential oil of all plants affected the growth of *Aspergillus sp*. Thus, at the dose of 10µl, inhibition zones of *A.niger* and *A.flavus* varied between 17 and 37mm, respectively; butthemycelial growthof two species, namely *A.fumigatus* and *A.ochraceus*, was completely inhibited. However, at the dose of 20µl, we observed theincrease of inhibition zones diameter in the other species, and *A.flavus* was totally inhibited. Thus, theMIC showed that *A.ochraceus* was the mostsensitive to *A.pusilla* Brot., with 0.1µl/ml. As regards to *C.atlantica* M., and *P.lentiscus* L.,the antifungal activity was very weak against identifiedstrains.The essential oil of*A.pusilla* Brot., showed a broad spectrum of inhibition and a remarkable antifungalefficacy on *Aspergillus sp.*

Keywords: *antifungal activity, essential oils, Aspergillus sp, durum wheat, post-harvest.*

CHEMICAL COMPOSITION, ANTIOXIDANT AND ANTIBACTERIAL ACTIVITIES OF THE ESSENTIAL OIL OF *MENTHA SPICATA* L. FROM ALGERIA

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Abstract

The genus *Mentha* is one of the most important genera of the Lamiaceae family. The most common and popular mint for cultivation is *M. spicata*. It is widely grown in temperate areas of the world, particularly in Africa, Temperate Asia and Europe, but nowadays it is cultivated throughout the world [12]. *Mentha spicata* (spearmint) is a perennial, rhizomatous and glabrous herb with a strong aromatic odor. The aim of the present study was to investigate the chemical composition, antioxidant and antibacterial activities of the essential oil of *Mentha spicata* L. from Algeria. The chemical composition of the essential oil of *Mentha spicata* L., collected from Ghardaïa (Algerian Septentrional Sahara)and hydrodistilled with Clevenger apparatus, was analyzed by GC and GC/MS. The researchers identified 29 components representing 96.43% of the essential oil, coprising *cis*-carvone oxide (44.06%), 1,8-cineole (15.32%), *cis*-dihydrocarvone (8.85%) and limonene (5.80%) as the major components. Antioxidant activity was investigated using β-carotene/linoleic acid, DPPH$^{\bullet}$, ABTS cation radical decolorization and metal chelating assays. The essential oil exhibited a moderate antioxidant activity in all the tests compared with the used standards, while the best inhibition was observed with the DPPH assay where the activity of the oil (IC_{50}: 93.45±1.42 µg/mL), was half lower than the activity of BHA (IC_{50}: 45.37±0.47 µg/mL), used as a standard. The essential oil exhibited the best antibacterial activity against *Escherichia coli* ATCC 25922, *Enterobacter aerogenes*, and *Proteus mirabilis* with 28 mm, 24 mm and 24 mm inhibition zone diameters, respectively, with MICs ranged 40-80 µg/mL.

Key words: *Mentha spicata, essential oil, antioxidant, antibacterial activity*

PHYTOCHEMICAL STUDIES AND ANTIBACTERIAL ACTIVITY OF AERIAL PARTS OF PHYSOSPERMUM VERTICILLATUM

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Abstract

In this study, we focused on the isolation and identification of the main compounds of aerial parts of P. verticillatum, namely triterpene, sterol, phenolic and fatty acid, which has not been reported before. Dichloromethane (CH2Cl2), ethyl acetate (AcOEt) and butanol (n-BuOH) extracts led to the isolation of ß amyrin(1), 3,11-dihydroxy-12-oleanene (2), pentadecanoic acid (3), spinasterol (4), spinasterol-3-O-ß-D-glucopyranoside (5) and saikochromic acid (6). These compounds were determined by using combined systems with high resolution tandem mass spectrometry (HPLC-TOF/MS), 1D NMR (1H NMR, 13C NMR) and 2D NMR(COSY, HSQC and HMBC). Further, the extracts CH2Cl2, EtOAc and n-BuOH demonstrated significant antibacterial activity.

Key words: *Physospermum verticillatum, phytochemical studies, antibacterial activity.*

INFESTATION OF OLIVE TREES GROWN IN KABYLIE BY OLIVE FLY BACTROCERAOLEAE

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Abstract

Three groves are chosen in Kabylia, Boudjima, Ait Aissa Mimoun and Maatkas regions in Algeria to study the main pes tof olive Bactroceraoleae. During one year, through 5 flycatchers, we captured 1. 120 individuals of Bactroceraoleae in Boudjima, 1.093 in Ait Aissa-Mimoun on chemlal variety. At Maatkas which includes two varieties chemlal and azeradj, we obtained 1.072 individuals. The maximum catch was reached in December at the three stations. Attack rates of olives B. oleae which begin in august increased to over 70 % in December on the two varieties in three groves of study. According to the guidelines, east part was the direction which was the most infested in the two varieties. The study of the hypogeum phase showed that the highest rates were recorded in the first centimeters of soil and it was the south part that had the most pupae in the three groves. The results of the chemical analysis of the oil of the two varieties, chemlal and azeradj showed that the acidity, the acid value and peroxide value increased with the elevation of olives infestation rates by Bactroceraoleae. For oils from olives hit 100 %, acidity rates range between 3,5 % and 4 %. The acid value were between 6,62 and 6,95 mg/g and the peroxide value recorded for its values ranged between 22,76 and 24,37 meq/kg.

Key words: *Kabylie, Bactroceraoleae, infestations, hypogeum phase, oil quality.*

IMPACT OF INSECTICIDES ON POLLINATOR POPULATIONS: ROLE OF PHYTOSANITARY PERFORMANCE INDICATORS IN CITRUS ORCHARD

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Abstract

Agrochemicals are considered to be among the major environmental threats to pollinators, including honey bees. In agronomy, pollination by bees increases the qualitative and quantitative yield of many crops. The majority of farmers systematically over-treat their orchards in order to have good quality fruits for as long as possible. Their choice is often directed towards the use of an effective product (case of deltamethrin and lambda cyhalothrin). Bees, particularly at the time of foraging, are at risk of exposure to phytosanitary treatment as a result of widespread treatment and their location, often near orchards. We evaluated the comparative effects of Lambda-cyhalothrin and Spinosad insecticide treatments on bees in tomato and orange plots. Yellow-colored water tanks placed inside the experimental units of tomato or suspended within the canopies of orange trees, allowed fluctuations in abundance to be established through the twice-daily catches of bees during a exposure period of 16 days. Bee populations showed very high sensitivity to both active ingredients at the registered dose and even half the dose during the 10 days following application of the treatments. Percentages of residual populations are very low during this period. Depending on the estimated temporal toxicity of the respective products, differences in recovery of bee activity are presented. Consideration of the intensity indicators of the plant protection products use is discussed.

Keywords: *Pollinators, pollutants, toxic, pesticides, agrosystems, Algeria.*

STUDIES OF THE DEVELOPMENT OF THE OVARY IN THE DATE PALM (*PHOENIX DACTYLIFERA* L.)

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Abstract

Floral morphology of the date palm was studied to complement the knowledge of its floral structure and trace the evolution of single carpel fruit. This results in the morphological transformation of the ovary, consisting of three carpels, mortification style, and the degeneration of the twin carpels. The morpho-histological changes are monitored before and after pollination. The three carpels have very specific positions relative to the petals. Carpel two twin white and of the same size are carried by the same petal. They are different from the third carpel worn only by the third petal. Development continues, the size of the third carpel becomes larger than twins carpel. After pollination, the white color of the carpel first turns green. Dissection carpel, exposing the eggs, lets us see that the three eggs are colored pink, but one is more colorful than the other two. Only the carpel containing a strongly colored egg develops into fruit. The other two degenerate by a deposit of polyphenols. A histological study has tracked the decline twins carpel and training the embryo sac of the third carpel. These studies show the change in color of the egg from the translucent natural state to a pink coloring corresponds to the increase in the mitotic intensity nucellar cells. The change from pink to white of the fertilized egg after formed the embryo sac becomes a seed.

Keywords: *carpel, fertilization, ovule, polyphénols, embryo sac.*

STUDY OF THE EFFECT OF THE INCORPORATION OF SPIRULINA ON THE NUTRITIONAL AND ORGANOLEPTIC QUALITY OF BOTH DAIRY PRODUCTS: CUSTARD AND FLAVORED STIRRED YOGHURT

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Abstract

The main objective of this work is to know the effect of the incorporation of spirulina on the physical and chemical quality and organoleptic properties of custard and flavored stirred yoghurt. First, the methodological approach is adopted to elaborate the different recipes of custard and flavored stirred yoghurt by varying the dose of spirulina added : 0.2g, 0.4g, 0.6g,; and the second, the realization of physical and chemical, , and microbiological analyses on the witness and the two finished products as well as on the raw material entered in their fabrication. Biochemical and sensory analyses were performed on finished products too. The results of microbiological analysis of raw materials and finished products showed that our samples conformed to JORA (1998) that there is total absence of searching germs. The results of physical and chemical parameters (pH, acidity, MG, EST…..) of raw materials and finished products surch as during a storage time of about one month (4°- 6°C) include among them the pH of custard (0.2g) of spirulina which is 6.38, 6.51, 6.52 « J_0 », « J_{14} » and « J_{29} », respectively, and EST of flavored stirred yoghurt (0.4g) of spirulina which is 21.56, 21.37, 21.35 « J_0 », « J_{14} » and « J_{21} », respectively, proved stable and conform with internal company standards. As a regards to biochemical analysis, the results that we have seen there is a significant improvement in the nutritional quality of finished products in protein, carbohydrate, vitamin C and fat. Finally, the results of sensory analysis showed on one hand the overall acceptability of color, texture, smell and taste only of elaborated product and in the other hand the test showed that the panel enjoyed the custard with 0.2g of spirulina, and the flavored stirred yoghurt with 0.4g of spirulina was found the most satisfying in test.

Keywords: *Custard, flavored stirred yoghurt, Spirulina, Quality, Analysis*.

IMPACT OF PLANT PROTECTION PRODUCTS ON THE PARAMETERS OF THE PROCESSION BIOCENOTIC ENTOMOLOGICAL AUXILIARY ASSOCIATED WITH CITRUS IN THE REGION MITIDJA, ALGERIA

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Abstract

The population census was conducted in an effort to understand how diversity is organized on the ground, searching for species of agricultural interest or save our entomological heritage. The collection also aims to identify existing populations, especially local species. It is a living process that illustrates the timeliness of the acclimation process and domestication of useful species. To exploit the variability of species in terms of plant health programs increasingly intensive, we need to know. The priority is to describe and inventory all entomological species. Sampling was carried out in some orchards not treated and intended for agricultural research work, while the latter are located respectively at 20, 30, 40 and 50 km of Algiers in full Mitidja which is a region to citrus vocation. We used different sampling means, light traps, pheromone traps and also mowing, knocking. The ecological indexes were used to interpret some variations, the diversity index, Jaccard, and analysis of variance. 98 insect species were inventoried, 12 of useful species belonging to the order Coleoptera, Hymenoptera and Neuroptera. The other species are pests, some very formidable and others less.

Keywords: *Citrus, entomology, inventory, Mitidja, Auxiliary.*

EFFECT OF FUNGI ON THE STRUCTURE OF THE DESERT LOCUST EGG CHORION SCHISTOCERCA GREGARIA (FORSKÅL, 1775) (CYRTACANTHACRIDINAE, ACRIDIDAE)

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Abstract

The purpose of our work is to study the effect of two entomopathogenes, *Beauveria bassiana* and *Metarhizium anisopliae var. acridum* on the embryonic state of *Schistocerca gregaria,* by holding account their influence on the blossoming into 1st place. For that we carried out 2 types of treatment. In the 1st standard we pulverized the inoculum on sand and we chose 3 amounts: D1: 4 X 10^6 spores/ml, D2: 2 X 10^6 spores/ml, D3: 10^6 spores/ml for two mushrooms with a witness. For the 2 2nd type we pulverized the inoculum directly on eggs and we studied two cases, where we carried out a treatment the very same day of the laying for the 1st case and another treatment the 8th day after the laying for the 2 2nd case, with the amount 4 X 10^6 spores/ml for two mushrooms. Then their action on the structure of the chorion of eggs, also by using two types of treatments (on sand or directly on eggs), with one only proportions which is the same one for the two mushrooms (4 X 10^6 spores/ml). We managed to conclude that our two mushrooms were not significantly effective for the direct handling on the 8 days old eggs and that they marked a significant effectiveness for the treatment directly on eggs the same day of the laying. The treatment on sand marked a nonsignificant for *M. anisopliae* and significant effectiveness for *B. bassiana*. And concerning the structure of the chorion, the treatment by the 2 cryptogams did not cause any microscopic lesion. We noted thatthere was no difference between the egg witness and their treat with two mushrooms to 4 2nd, 8 2nd and 12 2nd day, but we can note that this structure differs according to the stage, from where it be made up only by the extrachorion and the exochorion for the egg of 4rd day witness and treat by the mushroom. For the most developed embryonic stages (8th and 12th day), the chorion is composed of three layers: the extrachorion, the exochorion and the endochorion and followed by the periplasm for the witnesses and the treaties to the two cryptogams.

Key words: *Schistocerca gregaria, eggs, chorion, Beauveria bassiana, Metarhizium anisopliae var. acridum, blossomings.*

EVALUATION OF THE EFFECT OF THREE PRODUCTS FEW PARAMETERS BIOPHYSIOLOGICAL OF THE DESERT LOCUST

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Abstract

Our work is based on the use of three biopesticides, an entomopathogenic fungus *Metarhizium anisopliae var. acridum*, a disruptor growth the Triflumuron (T.F.M.) and the henna extract *Lawsonia inermis* on the L5 larvae of *Schistocerca gregaria*. For that, we tested their effect on morphology, and the development of the L5 larvae. Lastly, we tested the effect from these three biopesticides on hemolymphatic proteins of the L5 larvae, in the plan quantitative and qualitative. The results obtained show us that the three biopesticides involved morphological deformations in the L5 larvae, even also which they do not allow the passage of the L5 stage at the stage imago in the treated insects. Finally, we can also notice that the three biopesticides caused deteriorations on the level of the proteinemy of *Schistocerca gregaria*.

Keywords: *Schistocerca gregaria, Metarhizium anisopliae var acridum, Triflumuron, Lawsonia inermis, development, reproduction, proteins hemolymphatic.*

COMPARATIVE STUDY OF THE EFFECT OF TWO BIOPESTICIDES ON THE HISTOLOGICAL STRUCTURE OF THE DIGESTIVE TRACT OF L5 LARVAE OF *LOCUSTA MIGRATORIA*

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Abstract

Our work involves evaluating the effect of two biopesticides, an entomopathogenic fungus, M.anisopliae var. acridium and a medicinal plant, Lowsonia inermis, on larvae of the fifth stage of the migratory locust L. migratoria. Two parameters were studied, namely: the morphology and histological structure of the digestive tract of the larvae. The obtained results showed a sensitivity of L5 larvae of L. migratoria to these two products. The effect of these two products was manifested by an inhibition of the moult phenomenon which led to changes in size and color and also morphological deformities. As for the effect of these two products on the anatomical structure of the digestive tract of the L5 larvae, examination of the various histological sections showed some histological changes in the treated individuals compared to the controls.

Keywords: *Locusta migratoria, Metarhizium anisopliae var acridum, Lawsonia inermis, digestive tract, morphology.*

EVALUATION OF THE SAHARAN HALOPHYTE PLANTHALOCNEMUMSTROBILACEUM (CHENOPODIACAE) AS A SOURCE OF REPELLENTS, OXICANTS AND PROTECTANTS AGAINST THE STORAGE PEST TRIBOLIUMCASTANEUM (COLEOPTERA – TENEBRIONIDAE)

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Abstract

Halocnemumstobilaceum (Chenopodiaceae) is one of many halophyte plants from the Algerian Sahara Desert. In this study, weinvestigated the phytochemical composition and the insecticidal activity of the crude ethanolic extract of this plant against adults of the red flour beetle *Triboliumcastaneum* (Coleoptera: Tenebrionidae). The repellent effect was evaluated, at the concentration of 1000 µg/ insect, using the preferential zone method on blotting paper. The insecticidal effect was investigated by testing 5 doses: 100, 200, 400, 800 and 1000 µg/insect. The obtained results show that *H. stobilaceum*is very rich in saponins, gallic tannins, flavonoids and alkaloids. The plant is poor in irridoids. At the insecticidal level, the extract tested at dose 1000 µg/insect has a good repellent effect on adults of *T.castaneum*.The repulsively rate calculated after two hours of exposure was 60%. The extract was also toxic. The five tested doses caused mortalities of 15, 33.3, 41.6 and 70%, respectively, after 6 hours of exposure. The highest dose (1000 µg/insect) generated 100 deaths after 96 h of exposure. LD_{50} calculated 24 h after treatment was 225.4 µg/insect. The obtained results suggest that extracts of this plant can be used to protect the stored products against insect secondary pests.

Keywords: *Crude ethanolic extract, Halocnemumstobilaceum, repellency, toxicity, Tribolium castaneum.*

HOW DO SURFACTANTS IMPROVE SPRAY RETENTION BY BARLEY LEAVES?

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Abstract

Phenomena governing spray retention on plants are investigated for a very long time in order to optimise pesticide application. These can be divided in physical and chemical properties of either the target or the drop. Leaf morphology may play an important role in spray deposition. Different leaf structures such as wax, hairs, edges and veins are important impingement and retention variables. Surfactants are nowadays very useful additives to improve the effectiveness of phytosanitary treatments. They contribute to change of impact types and thus the amount of spray retained by the leaves of the treated plant. We performed tests of retention on whole barley plants on BBCH-scale 12 and small pieces of barley leaves at the same stage of growth. Spraying was done in three ways: water without surfactant, water with Break-Thru® S240 and water with Li700®. The three slurries of fluorescein contained in an amount of 0.2 g / l. Fluorescein retained by the leaves in both cases was then measured by a spectrofluoremeter. The retention tests on whole plants showed that it was tripled by the first surfactant and doubled by the second. By cons on small pieces of barley leaves, the amount was increased by the use of surfactants but not to the same scale. This study concluded that the use of surfactants in spray pesticides might increase the amount of retention as a function of leaf area and the surfactant used.

Keywords*: surfactant, impact, spray retention,barley.*

COUPLING SHADOWGRAPHY AND SPECTROFLUOROMETRY TO MEASURE SPRAY RETENTION

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Abstract

Study of spray retention should take into account target surface properties and impact behaviour. The aim of this experimentis to combine simultaneously conventional method based on the dosage of a tracer to quantify retention, and imaging method focusing on droplet behaviour during impact to gain the individual contribution of each droplet impact on effective retention. Measurements were performed with a high-speed camera coupled with a retro-LED lighting. Size and velocity of the drops were extracted by image analysis. Drops impact types were determined by the operator. Sprays were produced with a flat-fan nozzle Teejet 11003 mounted on a movable ramp at the speed of 2m/s. Two surfactants (Break-Thru® S240 and Li700®) were sprayed on BBCH 12 excised barley leaves (0,3cm²) and compared to water spray. Relative volume proportions were computed within an energy scale. After spraying, leaves samples were washed in a buffer solution for quantifying the amount of fluorescent tracer and so the effective volume of spray mixture retained by leaf surface. Coupling of these two approaches offers a thorough understanding of how the various impact outcomes contribute to spray retention by a leaf and how adjuvant acts on droplet impact.

Keywords*: spraying, retention, spectrofluorometry, shadowgraphy.*

PHYTOSANITARY PRACTICES AND OPERATOR EXPOSURE RISKS, CASE OF BISKRA – ALGERIA

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Abstract

Pesticides are widely used to control weeds, insects, fungi and other pests that are harmful to crops. However, these chemical inputs can also reach non-target areas as well as man via drift or by exposure. The large quantities of residues of active ingredients that are present in the human diet result in numerous diseases and nuisances to human health. To reduce these risks, all legislation has taken strict food safety measures by imposing well-defined standards on producers. These standards require good agricultural practices by reducing or even defending the use of certain chemical inputs. Other measures are indicated to ensure responsible use or good practicebefore, during and after phytosanitary treatment. Plant protection products can therefore be used safely as long as the requirements for use are met. It is therefore necessary to work in a responsible way to ensure the health of humans, animals and to protect the environment. The first exposed to this risk is the applicator. At all stages of treatment, the applicator of plant protection products may be at risk of acute or chronic poisoning. Effective protection during all stages of treatment, from spray preparation to sprayer cleaning becomes paramount. In this context we have tried to assess the exposure risks associated with realistic scenarios of how crop treatment products are applied by farmers in the region of Biskra, Algeria. Field data collected through surveys and observations have been used to feed mathematical models of exposure calculation.

Keywords: *Pesticides, spraying, exposure hazards, operator, good phytosanitary practices.*

SPRAY RETENTION VARIABILITY BY BARLEY

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Abstract

The effectiveness of a phytosanitary treatment depends on the amount of product actually retained by the plant leaves relative to the volume per hectare applied. Parameters affecting spray retention include application variables such as nozzle type, operating pressure and formulation, and target properties such as species and growth stage. These variables are conditioned by more specific parameters such as the number of droplet impacts by unit area of leaf, the droplet size and velocity distributions at impact, droplet physicochemical properties (dynamic surface tension and viscosity) for the application variables and leaf wettability, and plant architecture for the target. During a uniform treatment of the crop, each plant receives various droplet distributions that behave differently during impact depending on its architecture. In consequence, this contributes to increase in varying retentions observed between plants in field trials, leading in practice to application of an amount of product always greater than required to provide the level of crop protection needed for insuring high yields. The aim of this paper was to observe the retention variability that could occur during a treatment depending on the equipment, tank mix formulation and crop properties. The spray retention variability was assessed for three tank mix formulations: tap water, tap water with break thru, and tap water with Li700. For each formulation ten sprays were realized on five barley plants at the two leaves growth stage (BBCH stage 12) grown indoor in controlled conditions and ten sprays realized on individual barley plants at the same growth stage. The amount of spray actually retained by barley plants was assessed by dosing a fluorescent tracer added to the mixtures. Barley plants were placed linearly below the center of a moving nozzle at the speed of 2m/s using a pressure of 2 bars. The last step was measuring leaf area for each spray and calculating the amount of sprays retained by barley plants to determine the variability of spray retention.

Keywords*:* *surfactant, retention variability, barley.*

EFFECT OF DROP IMPACT BEHAVIOR ON SPRAY RETENTION BY PLANT LEAVES

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Abstract

Drop behaviour during impact affects retention. The increase of adhesion is usually seen as the objective when applying crop protection products, while bouncing and shattering are seen as detrimental to spray retention. However, observation of drop impacts using high speed shadowgraphy shows that fragmentation can occur in Wenzel wetting regime. In this case, a part of the drop sticks on the surface, what contributes to retention. Using simultaneous measurements of drop impacts with high speed imaging and of retention with fluorometry for 3 spray mixtures on excised barley leaves has allowed us to observe that about 50% of the drops fragmented in Wenzel state remain on the leaf. Depending on spray mixture, these impact outcomes accounted for 25 to 50% of retention, the higher contribution being correlated with bigger VMD (Volume Median Diameter). This contribution is non-negligible and should be considered when a modelling of spray retention process is performed.

Keywords: *Drop impact, Retention, splashing, fluorometry, high speed imaging.*

THE DIVERSITY OF FUNGI (PREDATORS AND PARASITES) OF KNOT NEMATODES (*MELOIDOGYNE* SP.) ACCORDING TO SOME PARAMETERS OF THE SOIL

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Abstract

In our work, we were interested in the study of useful fungi depending on soil type, organic matter, types of crop management products and insecticides and nematicidesused. We were able to identify 08 genus of nematophagous fungi (predators and parasites): *Arthorobotrys; Dactylaria; Dactylella; Myzocytium; Rhopalomyces; Triposporina; Stylopage; Harposporium.* We have found that different nematophagous fungi exhibited diversity. The most represented genus was *Arthorobotrys*. We have shown that the presence of fungi nematophagous was natural. It is a genus which trapping mechanismis not complex with L2 capture speed and ease of development in soils.We can say that the regions of Staoueli and Bordjel Kiffan have acerta in number of fungi that could be usefull in biological control. Finally, note that the study allowed us to highlight and drawattention to the desirability of using nematophagous fungi (predators and parasites) in biological control because this one is a likelyway to replace the chemical control due to a very diverse microfloracapable of giving ood results, and because studies have shown that it is necessary to have local strains.

Keywords*: Arthorobotrys, Meloidogynesp, organic matter, soil.*

INSECTS PLACE IN THE DIET OF STARLING STURNUS VULGARIS IN THE TEST GARDEN HAMMA (ALGERIA)

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Abstract

During the autumn and winter period, in the Test Garden Hamma located in the area of Algiers (Algeria), the Starling, *Sturnus vulgaris* ingests vegetal fragments and prey of small sizes. The most requested category by this specie is the class of insects (56.1%) in which Hymenoptera (72.4%) are the most common, followed by Coleoptera (23.7%). Among the found species, therewas an ant, *Messor barbarus* that appears as the most important. Among the consumed vegetal fragments, those of *Pistacia lentiscus* (71.8%) dominated, followed by *Olea europea* (10.1%). Subsequently, there were also the gastropods (3.7%), Myriapods (1.2%), arachnids (0.7%), crustaceans (0.3%) and undetermined arthropods (0.1%). The results pointed to the conclusion that in the surroundings of Algiers, which is part of the wintering area of *Sturnus vulgaris*, the diet of this Sturnidae was polyphagous with two strong insectivorous and frugivorous trends.

Keywords*: Starling, Sturnus vulgaris, diet, wintering area, Algeria.*

STARCH DIGESTION IN PEARL MILLET (PENNISETUM GLAUCUM (L)R.BR) FLOUR FROM ARID AREA OF ALGERIA

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Abstract

To assess the nutritive value of minor cereals cultivated in arid areas of Algeria, nine pearl millet landraces were sampled from two regions, Tidikelt and Hoggar. Some qualitative and quantitative characters of the panicle and grain were measured, as well as *in vitro* starch digestion of the grain flour. Considerable variation was recorded in seed color, endosperm texture and nutritional value of starch and protein content. *In vitro* starch digestion displayed a first-order kinetic model. For all pearl millet landraces, starch was digested to a different extent; the hydrolysis index (HI) ranged from 22.29 % to 35.52 % and the expected glycemic index (eGI) ranged from 27.41 to 38.82. The results showed that there was diversity in the physical and chemical properties of pearl millet accessions from the arid areas of Algeria, Tidikelt and Hoggar. This study confirms that pearl millet has an acceptable nutritional value with a low glycemic index suitable for human health and nutrition.

Key words: *Pearl millet, Starch digestion, First-order kinetics, Glycemic index, Nutrition.*

EVALUATION OF THE PHYTOTOXICITY OF ESSENTIAL OIL OF EUCALYPTUS ON THE GERMINATION OF SOME CEREALS

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Abstract

In Algeria, cereal products occupy a strategic place in the food system and in the national economy. Cereals can be infected by numerous fungal pathogens. Increased use of chemical agents, such as fungicides, negatively affects human health and environmental pollution, phytotoxicity and selection of resistant pathogen populations. Therefore, it is necessary to develop new methods to savory biological control, by the use of essential oils which are characterized by antiseptic, antiparasitic, antibacterial and antifungal properties. This work is part of the study of the phytotoxicity potential of *Eucalyptus camaldulensis* essential oil on the germination of three cereal species (common wheat, barley and oats), Essential oils were extracted by steam distillation using Clevenger-type apparatus adapted and analyzed. This prompted us to do an in vitro analysis of the seeds of cereals treated by soaking in the essential oil extract of *Eucalyptus camaldulensis* at a concentration of 50 µl. The results of the phytotoxicity tests show that the essential oil of *Eucalyptus camaldulensis* has a higher toxicity rate on the germination of the varieties *Avena sativa* L. subsp. Sativa (sonar) that (*Avena sativa L*. subs. Sativa (sonar)), while with barley (Saida183) it has have an average effect. In addition, we found no toxicity effects on wheat germination (*Triticum aestivum* L var) HD1220 (Sersou).

Key words: *phytotoxicity, cereal, Eucalyptus camaldulensis, essential oil, Ghardaïa.*

FUNCTIONAL FOOD TABLETS FROM DATE FRUIT POWDER ENRICHED WITH FREEZE-DRIED OLIVE LEAF EXTRACT

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Abstract

The present work aimed to study the formulation and characterization of functional food tablets from *Mech Degla* date fruit powder (DFP) (*Phoenix dactylifera L*.) enriched with *Chemlal* lyophilized aqueous extract of olive leaves (OLE) (*Olea europaea L*.). Physicochemical properties of DP and OLE like, water content, minerals, bioactive compound, MEB were evaluated. The flowability and cohesiveness of date fruit powder were also determined by Carr index and Hausner ratio. The tablet was prepared by direct compression technique using 97% of DP with 3% of OLE. The physicochemical characterization of tablet and oleuropein (chief constituent)of OLE) release were investigated. The lyophilized aqueous extract obtained from olive leaf powder consists of a concentrate of bioactive compounds: oleuropein (28.67%), phenolic compounds (15.40%) and flavonoids (13.84%). The date powder showed acceptable flow properties in terms of Husner's ratio (<1.25) and angle of repose (<30°). Tablets developed by direct compression with compression force 10 N shown acceptable hardness, friability and disintegration time, and good uniformity of weight. The kinetic release of oleuropein was 30%-35% for 60 minin dissolution medium (phosphate buffer, distilled water and HCl 0.1N). In addition, the Korsmeyer-Peppas equation described correctly (R^2>0.98) dissolution kinetic of oleuropein. The mechanism of oleuropein release from tablets was found to be Fikian.

Key words: *Dates powder, Olive leaf, Oleuropein, dissolution, tablet*.

STUDY OF THE TOLERANCE MECHANISMS UNDER WATER STRESS OF THREE WINTER BARLEY GENOTYPES (HORDEUM VULGARE L.)

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Abstract

In Algeria, cereal crops are concentrated mainly in arid and semi-arid areas, where climatic conditions seriously limit the potential of agricultural production. Due to the unpredictable nature of water stress, tolerance is the most effective strategy in severe and prolonged stress situations. In this study, we determined the morpho-physiological and biochemical changes of three winter barley genotypes (Rihane 03, Tichedrett and El-Fouara) grown under water deficit conditions. Soil grown 21-day-old plants (three-leaf stage) were subjected to progressive drought stress over 19 days water withholding followed by re-watering for 7 days. The results of this study showed that the water stress reduced Relative Water Content (RWC) and the leaf area in three barley genotypes, whereas the growth (in length and weight) of the shoots was reduced only for the two genotypes: Rihane 03 and Tichedrett. Chlorophyll content was reduced in the Rihane 03 genotype, while the Tichedrett and El-Fouara genotypes kept their pool of chlorophylls intact during dehydration. In addition, a strong accumulation of compatible solutes (soluble sugars and free proline) and soluble proteins content was recorded in the three genotypes. After the rehydration phase, rapid recovery was observed in Tichedrett and El-Fouara genotypes, unlike the genotype Rihane 03, whose recovery was slow. The results indicated that the magnitude ofwater stress effects depended on barley genotype. In fact, according to the different parameters studied, the two local barley genotypes: Tichedrett and El-Fouara appear to be tolerant to water stress unlike -the barley genotype introduced: Rihane 03, which is sensitive.

Keywords: *Winter Barley, water stress, growth parameters, chlorophylls, osmotic adjustment.*

ANTIFEEDANT ACTIVITY OF EXTRACTS FROM LAMIACEAE FAMILY PLANTS

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Abstract

Lamiaceae species form one of the largest families in the plantae kingdom with numerous aromatic and culinary species. *Marrubium vulgare* L. and *Origanum glandulosum* Desf. are medicinal plants belonging to this family. They are largely used in folk medicine to cure several pains such digestive disorders, rheumatism and cough. Although antifeedant and repellent plants have been known since ancient time, limited works focused on the defence mechanismsupported by their secondary metabolites Acetone extract of the aerial parts of these plants. These worksobtained results using a Soxhlet apparatus. The antifeedant assay was assessed on three herbivorous insects *Spodoptora littoralis, Myzus persicae* and *Rhopalosiphum padi* third in star larvae using this extract. A potent antifeedant effect was exhibited with *M. vulgare* extract against *S. littoralis* (95,5%) where as the percent settling inhibition of insects (*M. persicae*and *R. padi*) was moderate. In contrast, when determined for *O. glandulosum* extract, the former effect was moderate (50,33%) and the latter was important.

Key words: *Marrubium vulgare, Origanumglandulosum, antifeedant, extracts, insects.*

THRIPS TABACI DYNAMICS ON ONION CROPS OF THE ZIBAN, AN ARID ZONE OF ALGERIA

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Abstract

A study was conducted in an onion field at the locations of Ain Naga (during 2009/2010) and M'zirâa (during 2010/2011) from the Ziban, an arid zone of Algeria. The Thrips dynamics are determined by directly collecting from plant seedling to harvest. A field of 400m^2 is limited, where 40 plants are randomly selected, and checked weekly for Thrips presence, than Thrips are collected using a fine brush in a labeled vials containing ethanol at 60%. They are transferred immediately to the laboratory, where they are sorted, counted and some invidious are mounted on slide for identification. The date shows the presence of two Thrips species in onion field, with two activity periods. Thrips appeared from September to the end of onion cycle, but the number per plant is not important, and probably do not cause important damages even if some damage are observed on leaves. This may be explained by the date of onion cultivation.

Key words: *Thrips, onion, Algeria.*

CODLING MOTH (*LASPERESYA POMONELLA* L.) MONITORING IN THE REGION OF AIN-TOUTA, ALGERIA

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Abstract

A monitoring of codling moth *Lasperesya pomonella* L. was conducted in an apple orchard (Starkrimson variety) in Ain-Touta municipality belonging to Batna province, a semi arid region in Algeria. The monitoring is determined by sexual trapping; an Delta trap developed by INRA (Institut National de la Recherche Agronomique, France), was placed in the center of the orchard from mid-April (1997), the trap was replaced every four weeks. Two surveys are carried out per weeks (same week days) and the butterflies are counted and taken by a forceps. The curve of the flight of the pest is traced. The results obtained are compared with heat accumulations; considering the threshold temperature of this insect is 10°C (a thermograph is placed in the weather shelter from the first January). The flight graph showed that the codling moth is trivoltin, the first peak of flight was recorded on May 28, the second one was recorded on July 9, and the last one on August 26. These flights correspond simultaneously to the heat of accumulation of 303.5degree-days, 921.75degree-days and 1693degree-days. Previous dates may be the appropriate time to conduct effective chemical control.

Keywords: *Codling moth, dynamic, flight, heat accumulations, trap.*

STUDY OF TARG. 1868 (HOMOPTERA, DIASPIDIDAE) AND INVENTORY OF NATURAL ENEMIES IN A BIO-ECOLOGY OF THE WHITE SCALE PARLATORIA BLANCHARDI, PALM GROVE IN THE REGION OF BISKRA (ALGERIA)

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Abstract

Algeria possesses a very significant patrimony phoenicicole. The date palm plays an important socio-economic role in the quality and diversity of its products. Deglet Nour is known worldwide as the "Queen of dates". It is very popular either outside of the country as well as inside. The Algerian palm grove is mainly located in the South-East part of the country. Currently date palm and their productions are attacked by a range of diseases and pests. Among these different pests we have *Olygonychusafr asiaticus* (Boufroua), *Ectomyelois ceratoniae* (moth), *Apatemonochus* (Bougessas), *Parlatoria blanchardi* (white scale) and *palratoria blanchardi Targ.* which continues to grow in our oasis and cause significant damages. We performed this study in the southern Algerian region, located approximately 422 km South-East of the capital Algiers. Our work aimed to study the bio-ecology of this diaspine and the inventory of its natural enemies in Ain Benouib Biskra. Regarding guidance, we could say that the effect of solar radiation could be influenced by other factors. We included coverage of other neighboring palm palms, its isolation, the density of plantation, location against moisture sources, such as the presence of water, the presence of underlying crops that could minimize the increase or infiltration of solar radiation through the plantations and the air humidity in the place where the palm was located. All these factors could slow or accelerate the development of the white scale. We determined the presence of three complete generations of *Parlatoria blanchardi* and a partial fourth generation: Autumn, Spring, Summer and Winter generations. Natural enemies of the diaspine identified included *chrysopa vulgaris* (Nevroptera, Chrysopidae), C*ybo cephalus palmarum* (Coleoptera, Nitidulidae) *Pharoscymnus ovoideus* and *Pharoscymnus numidicus* (Coleoptera, Coccinellidae).

Key words: *Algeria, monitoring, stages, development, abiotic factors, Degletnour*.

COMPOSITION AND BIOLOGICAL ACTIVITIES OF SEED OILS OF TWO *CRATAEGUS* SPECIES GROWING IN ALGERIA

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Abstract

Crataegus fruits are consumed by the Algerian population in autumn. Several ethno pharmacological surveys on the therapeutic uses of *Crataegus azarolus* L., a predominant species that populates the mountains of the Mediterranean basin, have revealed the use of this plant in the Arab traditional medicine to treat cardiovascular diseases, as well as cancer and diabetes. *Crataegus monogyna* Jacq. is commonly used for treating circulatory and respiratory system disorders, insomnia and some nervous system disorders, such as memory loss, migraines, irritability and confusion. Oils extracted from seeds of two *Crataegus* species **(**Rosaceae), *Crataegus azarolus* L. and *Crataegus monogyna* Jacq., collected from Constantine (eastern Algeria), were analyzed by GC and GC/MS. The main components of *C. azarolus* were tetradecamethylcycloheptasiloxane (39.43%), 3,4-dihydroxytetramethylsilyl mandelic acid (19.23%), dodecamethylcyclohexasiloxane (17.14%), decamethylcyclopentasiloxane (10.57%) and 3-isopropoxy-1,1,1,7,7,7-hexamethyl-3,5,5 tris(trimethylsiloxy)tetrasiloxane (5.66%). It's the first report on *C. monogyna* seed oil. The major constituents of *C. monogyna* seed oil were found to be linoleic acid (44.2%), oleic acid (28.26%), oxalic acid, bis(trimethylsilyl) ester (9.74%), palmitic acid (6.56%) and tetracosamethylcyclododecasiloxane (5.04%). The antioxidant activity was detected with β-carotene bleaching method. The seed oil of *C. monogyna* exhibited a higher antioxidant activity than the seeds of *C. azarolus* with 77.75% inhibition at 4 mg/mL, which is close to the standard vitamin E (80.5%) at the same concentration. The antibacterial activity was performed with disc diffusion and minimum inhibitory concentration (MIC) methods and the results showed that the oils possess a mild antibacterial activity.

Key words: *Crataegus, Rosaceae, seed oil, antioxidant, antibacterial activity.*

DIVERSITY OF WEED FLORA IN HERZEGOVINA REGION (BOSNIA AND HERZEGOVINA)

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Abstract

Floristic and phytocoenological research of weed flora and vegetation in Herzegovina regiaon (Bosnia and Herzegovina) was performed at 102 localities (including vineyards, olive groves, orchards and tilled fields). Survey was carried out during three seasons (2009, 2010 and 2011) from early spring till late autumn. Altogether, 113 species of vascular plants were recorded, with domination of therophytes (45.86%) and hemicryptophytes (39.85%). Phytogeographical analysis has differentiated 9 floral groups and between them the most dominant were: Cosmopolitan, Eurasian, Mediterranean, Boreal, Adventive and sub-Mediterranean consisting of 106 species (93.98%).

Key words: *weed flora, Herzegovina, diversity.*

DETERMINATION OF PESTICIDE RESIDUES IN STRAWBERRIES BY GAS CHROMATOGRAPHY-MASS SPECTROMETRY METHOD

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Abstract

Pesticide residue analysis in fruits and vegetables is one of the most important and challenging tasks in food analysis. The European legislation (European Regulation 396/2005 and Commission Directive 2006/125/EC), sets maximum residue limits (MRL) of pesticides in different products of plant and animal origin. This is a significant analytical challenge with respect to the low limits of quantification (LOQ) required for some specified matrices. Pesticide residues in fruits and vegetables are among the primary sources of pesticide exposure through diet. Strawberries are particularly vulnerable to pesticide contamination because their soft, porous exterior makes them absorb more pesticides. Their soft texture also makes them difficult to clean thoroughly, which makes the problem even worse. The aim of this work is to analyze strawberry samples from different geographical areas of Bosnia and Herzegovina and to evaluate which pesticides and in which concentrations are most frequently used.

Keywords: *pesticide residues, strawberry, gas chromatography, maximum residue limit, food safety.*

PRESENCE OF HEAVY METALS AND MACRO ELEMENTS IN MONOFLOWER AND MULTIFLOWER TYPES OF HONEY IN BOSNIA AND HERZEGOVINA

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Abstract

Honey is a high-quality diet of humans, but the mineral content depends on several different factors. In this study on five types of honey, monoflower locust (*Robinia pseudoacacia* L.), chestnut (*Castanea sativa Mill*.) and sage (*Salvia officinalis*), and multiflower forest and floral honey from the territory of Bosnia and Herzegovina we determined heavy metals and macro -elements (As, Cd, Pb, Ba, Na, Mg, K, Ca, Ag te Al) using the technique of inductively coupled plasma with mass spectrometry (ICP-MS). Mean concentrations found in five types of honey ranged (μg/kg) as follows: As 0,83-1,23; Cd 0,39-4,52; Pb 10,02-17,6; Ba 51,1-649,0 i Ag 0,015-0,24; (mg/kg): Al 0,26-2,88; Na 3,21-7,68; Mg 17,8-96,1; K 425,3-1.501; Ca 52,5-100,2. Botanical composition of honey significantly affected the mineral composition and it was found that black locust contains the largest concentrations of the following elements (mg/kg): K 1501, Ca 100,2, Na 7,68 iPb 17,6 and the lowest content of Al 0,26 mg/kg. Sage honey contains the largest concentrations of the following elements (μg/kg): Ag 0,24 and Mg 91,1 mg/kg, and the lowest content of Ca 52.5 mg/kg. The highest levels of (μg/kg): Cd 4,52 and As 1,23 were measured in chestnut, while the lowest were of (μg/kg): Ba 51.1 and Pb 10.2 and for (mg/kg): K 425.3 and Na 3.21. Forest honey contains the highest concentration of Al 2.88 mg/kg and Ba 649.0 μg/kg and the lowest was found in As0.83 μg/kg. In floral honeys we found largest number of elements with the lowest concentrations of (μg/kg): Cd 0,39; Ag 0,015; and Mg 17,8 mg/kg. In addition to the botanical composition, and according to comparison with other studies, it can be concluded that geographical origin and environmental factors also have substantial impact on the mineral composition of honeys.

Keywords: *honey, heavy metals, macro elements, Bosnia and Herzegovina.*

DISTRIBUTION MAPPING OF SELECTED INVASIVE WEED SPECIES IN NORTH WESTERN AREA OF REPUBLIC OF SRPSKA (BOSNIA AND HERZEGOVINA)

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Abstract

Invasive weed species are characterized by rapid spread and successful establishment, occupying different habitats and thus potentially pose a threat to the biodiversity around the world. In recent years, a wide distribution of invasive weed species in north western area of the Entity of Republic of Srpska (Bosnia and Herzegovina) caused irreparable and obvious damage across different habitat type. Considering problems such as their wide spreadingand negative ecological, economic and social impact, studies in north western area of RS are addressed to selected invasive weed species. Among many, the most invasiveis *Ambrosia artemisiifolia* L., threatening agricultural production and human health. However, a significant importance is placed on other invasive weed species, such as*Asclepias syriaca* L., *Helianthus tuberosus* L. and *Fallopia japonica* (Hout.) Ronse Decre. Distribution and abundance parameters for selected invasive weed species were done for 62 stands based on Blanque Braun (1964) method and GIS software. Assessment of their occurrence and distribution wastaken along the roads in the urban areas, between the settlements in ruderal and less arable land, on the edges of farmland, on arable land, along the rivers and fish ponds, in ditches and on the edges of forests. Mapping ofabove mentioned weed species revealed a wide-spread distributionand renewal potential of selected weed species, thus presenting a real threat to native flora and different habitat type.

Keywords: *distribution, mapping, invasive weed species, Republic of Srpska.*

HERBICIDE EFFICIENCY TESTING IN SOYBEAN DURING 2014–2016

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Abstract

Weed species present a significant limiting factor in soybean production. Their competitivness is more evident in drier years, often resulting in an unfavorable harvest, increased grain moisture and decreased quality and yield of soybean. Thus, a special emphasis is placed on effective weed management programs. Within a cooperative Danube-Soya Program, Public Institution „Agriculture Institute of Republic of Srpska, Banja Luka“ (PI AIRS, BL) from Bosnia and Herzegovina has taken an active role in the effective weed management programs in the production of non-genetically modified soybean. Total 19 herbicide combinations on weed populations in soybean in the Banja Luka region were tested during three-year period. Efficiency test of 5 herbicide combinations during 2014, 6 herbicide combinations during 2015 and 8 herbicide combinations during 2016 was carried out on the experimental fields of PI AIRS, Banja Luka. In 2014, heavy rainfall caused constant emergence of weed species throughout the vegetation period of soybean, resulting in satisfactory efficiency of applied pre. em. herbicide combinations with corrective treatments. High efficiency was only achieved by herbicides applied after sowing and before emergence of soybean with corrective treatment. In 2015, high efficiency was achieved by herbicide applied after sowing and before emergence of soybean with a corrective treatment, while satisfactory efficiency was achieved with post. em. herbicide combinations. In 2016, pre. em. herbicide combinations with corrective treatments achieved high efficiency.

Keywords: *herbicide efficiency, soybean, Danube-Soya Program.*

SEASONAL DYNAMICS OF AERO-ALERGENIC RAGWEED POLLEN IN BANJA LUKA (BOSNIA AND HERZEGOVINA) DURING 2012-2016

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Abstract

The problem of human sensitivity to ragweed pollen in our country lately is characterized by increasing trend. This is corroborated by the results of the population analysis (late adolescence patients) by skin prick test to pollen from Clinical Center Banja Luka (Entity of Republic of Srpska, Bosnia and Herzegovina). Research conducted in the ten-year period (2001-2010) showed that from the individual weed pollen in the total sample and by groups of respondents prick test is mainly positive to ragweed. Considering the above mentioned and the fact that *Ambrosia artemisiifolia* L. is widespread in the area of Banja Luka, the main aim of this study was to analyze the seasonal dynamics of ragweed pollen during a five-year monitoring (2012-2016). Sampling of ragweed pollen during the pollination period 2012-2016 was conducted in urban, industrial part of Banja Luka in PI AIRS, BL with Hirst sampler using the method defined by the International Association for Aerobiology (IAA). During the five-year monitoring, the highest annual total concentration of *Ambrosia* pollen grains was recorder during 2012 (8.983 p/m^3). Lower annual total concentration of *Ambrosia* pollen grains was recorder during 2013 (5.004 p/m^3), 2014 (4.970 p/m^3), 2015 (5.478 p/m^3) and 2016 (5.256 p/m^3). However, considering clinical thresholds that lead to the symptoms of allergy can be as low as 1-3 p/m^3 of air for hypersensitive patients and 10-50 p/m^3 for the majority of the patients, conducted monitoring pointed out on *Ambrosia* pollen as a growing health and social problem in our country.

Keywords: *seasonal dynamics, aero allergen, ragweed, Banja Luka.*

CONTRIBUTION TO KNOWLEDGE OF THE BIOLOGY OF PEAR SHOOT SAWFLY (*JANUS COMPRESSUS* FABRICIUS)

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Abstract

Field trial was carried outin pear orchard area during 2011 and 2012 at locality Jablan (Laktaši Municipality in the Entity of Republic of Srpska, Bosnia and Herzegovina). The aim was to study life cycle, biological and morphological characteristics of the pest. The emergence of adults was monitored with yellow sticky traps produced by Bio Plantella. Biology and morphology of pear saw fly was studied by monitoring and observation of different stages. Life cycle of the pest was monitored by direct observation in natural environment. Morphological characteristics of different stages were observed and studied using a laboratory stereomicroscope. The pest is univoltine in climatic conditions of Banja Luka's region. Pear shoot sawfly emerges from the end of April until the end of May with the peak population around May 1st. Adults have elongated body, and sexual dimorphism is present. Female lays eggs in very specific way by making stabs with ovipositor on young shoots spirally from the top to the bottom of the shoot. Egg is whitish or light yellow. Embryonic development lasts from 12 to 14 days. Fully grown larvae are about 10 mm long and have a characteristic shape of letter "S". During September larvae finish their development and make hibernation chamber where they over winter. Larvae spend its whole life in infested shoots. Pupa is found in spring, at the end of March and beginning of April. Pupa is exarate and pupal stage lasts 4-5 weeks.

Key words: *pear shoot sawfly, biology, morphology, Banja Luka's region.*

OCCURRENCE OF FUSARIUM HEAD BLIGHT IN CONDITIONS OF NATURAL INFECTION IN WINTER WHEAT AND EFFICIENCY OF APPLIED FUNGICIDE

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Abstract

During April, May and June 2014 frequent and extremely heavy rainfall and floods in our area caused high occurrence of *Fusarium* species in winter wheat. Fusarium head blight (FHB) presents a worldwide problem and it is the most important disease in wheat. It can be caused by a complex of a number of *Fusarium* species. Their distribution in almost all agro-climatic regions of the world is conditioned by their high adaptable capacity to various extreme environmental conditions. In the last few years great attention is particularly focused on the risk of FHB of various types of small grains, not only because they cause yield reduction which reaches 10-70%, but primarily due to the production of mycotoxins. The main objective of this study was to determine the intensity occurrence of FHB and make the identification of *Fusarium* species in the area of Banja Luka, as well as to consider the possibility of effective chemical control. Efficiency of prothioconazole + tebuconazole was carried out on two winter wheat varieties (Orion and Nova Bosanka) in the experimental fields of PI AIRS, Banja Luka (Entity of Republic of Srpska, Bosnia and Herzegovina) according to EPPO standards. Visual assessment of FHB intensity was made according to Miedaner *et* Perkowski (1996) scale. The identification of sampled ears pointed out the presence of two *Fusarium* species, *F. culmorum* and *F. graminearum,* respectively. Considering the environmental conditions in 2014, high intensity of *Fusarium* species in both varieties of winter wheat was observed. However, applied fungicide showed high efficiency (>90%), with a small difference in coefficient of efficiency Ce (%) between treated varieties.

Keywords: *FHB, natural infection, identification of Fusarium species, fungicide protection.*

EFFICACY OF NEW HERBICIDES AND HERBICIDE COMBINATIONS ON CORIANDER (*CORIANDRUM SATIVUM* L.)

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Abstract

The research was conducted during 2013 - 2015 on a pellic vertisol soil type. The subject-matter of this research was Bulgarian coriander cultivar Lozen 1 (*Coriandrum sativum* L.). Factor A included no treated check, 6 soil-applied herbicides – Tender EC (S-metolachlor) - 1.5 l/ha, Silba SC (metolachlor + terbuthylazine) - 3.5 l/ha, Sharpen 33 EC (pendimethalin) - 5 l/ha, Merlin flex 480 SC (isoxaflutole) - 420 g/ha, Smerch 24 EC (oxyfluorfen) - 1 l/ha, Raft 400 SC (oxidiargil) - 1 l/ha and 5 foliarly applied herbicides – Kalin flo (linuron) - 2 l/ha, Eclipse 70 DWG (metribuzine) - 500 g/ha, Sultan 500 SC (metazachlor) - 2 l/ha, Corrida 75 DWG (tribenuron-methyl) - 20 g/ha, Lontrel 300 EC (clopyralid) - 500 ml/ha. Factor B included no treated check and 1 antigraminaceous herbicide – Tiger platinium 5 EC (quizalofop-P-ethyl) - 2.5 l/ha. The soil-applied herbicides were used in the period between sowing and plant emergence. The foliarly applied herbicides were used at the rosette stage of the coriander. All of the herbicides, herbicide combinations and herbicide tank-mixtures were applied in a working solution of 200 l/ha. Mixing of the foliarly applied herbicides was done in the tank on the sprayer. Combinations of antigraminaceous herbicide Tiger platinum with soil-applied herbicides Tender, Silba Sharpen, Merlin flex, Smerch and Raft and foliarly applied herbicides Kalin flo, Eclipse, Sultan, Corrida and Lontrel do not reduce herbicide efficacy. Volunteer durum wheat crops in coriander crops were successfully controlled with the foliarly applied herbicide Tiger platinum. High yields of coriander seeds were obtained with the foliar treatment with the antigraminaceous herbicide Tiger platinum after soil-applied herbicides Raft, Smerch, Sharpen, Silba and Tender. The tank mixtures of Tiger platinum with foliar herbicides Kalin flo, Eclipse, Sultan, Corrida and Lontrel also led to high seed yields. The use of the soil-applied herbicide Merlin flex did not increase the seed yield, due to its higher phytotoxicity against coriander. Sole use of soil-applied or foliarly applied herbicides leads to lower yields due to the fact that they must be combined for full control of weeds in coriander crops.

Key words: *coriander, herbicides, efficacy, selectivity, seed yield*

EFFICACY OF NEW HERBICIDES AND HERBICIDE COMBINATIONS ON MILK THISTLE (*SILYBUM MARIANUM* GAERTN.)

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Abstract

The research was conducted during 2013 - 2015 on a pellic vertisol soil type. The subject-matter of this research was Bulgarian milk thistle cultivar Silmar (*Silybum marianum* Gaertn.). Factor A included no treated check, 6 soil-applied herbicides – Tender EC (S-metolachlor) - 1.5 l/ha, Sharpen 33 EC (pendimethalin) - 5 l/ha, Merlin flex 480 SC (isoxaflutole) - 420 g/ha, Smerch 24 EC (oxyfluorfen) - 1 l/ha, Raft 400 SC (oxidiargil) - 1 l/ha, Eagle 75 DF (chlorsulfuron) - 20 g/ha and 5 foliarly applied herbicides – Kalin flo (linuron) - 2 l/ha, Eclipse 70 DWG (metribuzine) - 500 g/ha, Sultan 500 SC (metazachlor) - 2 l/ha, Granstar super 50 SG (tribenuron-methyl + tifensulfuron-methyl) - 40 g/ha, Starane 250 EK (fluroxypyr) - 300 ml/ha. Factor B included no treated check and 1 antigraminaceous herbicide – Tiger platinium 5 EC (quizalofop-P-ethyl) - 2.5 l/ha. The soil-applied herbicides were used in the period between sowing and emergence. The foliarly applied herbicides were used at the rosette stage of the milk thistle. All of the herbicides, herbicide combinations and herbicide tank-mixtures were applied in a working solution of 200 l/ha. Mixing of the foliarly applied herbicides was done in the tank on the sprayer. Combinations of antigraminaceous herbicide Tiger platinum with soil-applied herbicides Tender, Sharpen, Merlin flex, Smerch, Raft and Eagle and foliar-applied herbicides Kalin flo, Eclipse, Sultan, Granstar super and Starane do not reduce herbicide efficacy. Volunteer durum wheat crops in milk thistle crops were successfully controlled with the foliarly applied herbicide Tiger platinum. The tank mixtures of the antigraminaceous herbicide Tiger platinum with foliar herbicides Kalin flo, Eclipse, Sultan, Granstar super and Starane led to high seed yields of the milk thistle. High yield seeds were also obtained with the foliar treatment with Tiger platinum after soil-applied herbicides Raft, Sharpen and Eagle. The use of the soil-applied herbicides Smerch, Merlin flex and Tender did not increase the seed yield, due to higher phytotoxicity of Smerch and Merlin flex to milk thistle and lower herbicide efficacy of Tender. Sole use of soil-applied or foliarly applied herbicides leads to lower yields due to the fact that they must be combined for full control of weeds in milk thistle crops.

Key words: *milk thistle, herbicides, efficacy, selectivity, seed yield*

SYNTHESIS AND ANTIMICROBIAL ACTIVITY OF NEW 1,8-NAPHTHALIMIDE DERIVATIVES WITH NON-PROTEIN AMINO ACIDS

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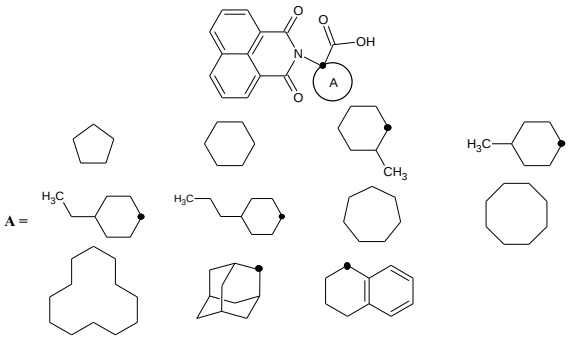
Abstract

This study presents the synthesis of new 1,8-naphthalimides, based on the interaction of a series of non-protein amino acids with 1,8-naphthalic anhydride. The synthesized products were characterized by physicochemical parameters, ^{1}H, ^{13}C NMR and IR spectroscopy as well as quantum-chemical calculations. The structures of the titled compounds were optimized using DFT methods at B3LYP/6-31G(d,p) level. In order to predict the proton and carbon chemical shielding, the methods currently employed are the ab-initio (MP2), Hartee-Fock or density functional calculations and different basis sets applying the gauge-including atomic orbitals (GIAO) approach and B3LYP/6-31G(d) optimized geometry.



The antimicrobial activity of the products obtained was determined against *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli, Pseudomonas aeruginosa*, *Salmonella abony*, *Providencia rettgeri*, *Candida albicans*, *Saccharomyces cerevisiae*, *Penicillium chrysogenum*, *Aspergillus niger*, *Fusarium oxysporum*, *Pythium ultimum* and *Pseudomonas syringae*.

Keywords: *Synthesis, Antimicrobial Activity, 1,8-Naphthalimide Derivatives, Non-Protein Amino Acids.*

SYNTHESIS AND ANTIMICROBIAL ACTIVITY OF NEW 1,8-NAPHTHALIMIDE DERIVATIVES WITH 3-AMINOSPIRO-5-HYDANTOINS

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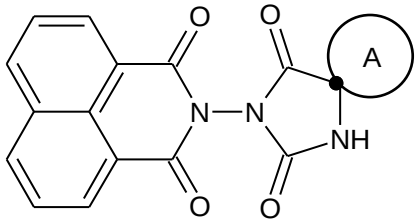
Abstract

This study presents a method for synthesis of new biologically active 1,8-naphthalimides. The target compounds were obtained by an interaction of 1,8-naphthalic anhydride with a series of 3-aminospiro-5-hydantoins. The synthesized products were characterized by physicochemical parameters, ^{1}H, ^{13}C NMR and IR spectroscopy.



The antimicrobial activity of the products obtained was determined against *Staphylococcus aureus, Bacillus subtilis, Escherichia coli, Pseudomonas aeruginosa*, *Salmonella abony, Candida albicans, Saccharomyces cerevisiae*, *Penicillium chrysogenum*, *Aspergillus niger*, *Fusarium oxysporum*, *Pythium ultimum* and *Pseudomonas syringae*.

Keywords: *Synthesis, Antimicrobial Activity, 1,8-Naphthalimide Derivatives, 3-Aminospiro-5-hydantoins.*

USING OF SOLAR ENERGY IN LIGHTING INSECT TRAPS AS ONE OF THE EFFECTIVE METHODS USED IN INTEGRATED PEST MANAGEMENT PROGRAMS (IPM) FOR DATE PALM INSECT PEST

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Abstract

Given the importance of light traps in the integrated pest management programs (IPM) for insect pests of date palm and dates in order to determine the time of emergence of new generations of insects and therefore can determine the proper time of pesticide application in addition to catching insects and reduce its numbers and identifying the visiting insects. Moreover, due to the lack of electrical sources in palm groves, large farms especially as well as its higher cost compared to solar energy. So, was searching for an alternative safe and economic electric power source in lighting the light traps which is the solar energy. The objective of this paper is to highlight Using of solar energy in lighting insect traps as one of the effective methods used in integrated pest management programs (IPM) for date palm insect pest as an agriculture innovation where The first implementation of this innovative were in the agricultural projects management of Saleh Al-Rajhi endowments management in Buraidah ,Qassim region and Durma in Riyadh, KSA, 1998.

Key words: *Innovation, Sustainability, Agriculture, IPM.*

A COMPARATIVE STUDY BETWEEN CONVENTIONAL AND INTEGRATED PEST MANAGEMENT TO CONTROL GERMAN COCKROACHES, *BLATTELLA GERMANICA* (L) IN FOOD ESTABLISHMENT

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Abstract

The effectiveness, sanitation, cost and pesticide residues of an integrated pest management (IPM) program compared to conventional pest control (CPC) against German Cockroaches, *Blattella germanica* (L) were studied in three huge commercial hypermarkets in Egypt. The IPM program was done through inspection, monitoring, educational programs, sanitation, harborage removal, trap, vacuuming and new techniques with limited use of pesticides. On the other hand, CPC was done by using insecticides only with void and space treatment techniques. Sticky traps were used as a tool for monitoring cockroach population density. The results showed that the IPM program significantly decreased trap catch reduction (70.1 %), compared to CPC (49.5%) after four weeks of the initial intervention. The infested places after twenty- four weeks were 99.2% and 69.1% for IPM and CPC, respectively. During the IPM program the level of sanitation was significantly improved. There was a significant correlation between the rate of infestation and sanitation ($rs = 0.8^{**}$, $P < 0.01$). The calculated cost of the IPM program was significantly higher than that of CPC at the initial service but it decreased at intervals with time. In addition, the residues of pesticides were significantly higher in swab samples of the CPC treatment for all treated surfaces in comparing with those taken from the IPM program. Furthermore, the questionnaire given to hypermarkets employers showed their satisfaction of using IPM rather than the CPC program. The results show that the IPM program was more effective and environmentally-friendly than -the conventional approach of using pesticide to manage problems with cockroaches.

Key words: *Blattella germanica, conventional treatment, hypermarkets, IPM, pesticide residues, sanitation rate.*

BIOCHEMICAL AND MOLECULAR EVALUATION OF SYNTHETIC AND NATURAL FOOD ADDITIVES ON RATS

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Abstract

Different kinds of additives are widely applied in food industry. The rationale for their use is preservation, coloring or sweetening of diverse foods. However, several side effects were noticed due to their hazard effects. Haematological, biochemical and molecular studies were carried out to evaluate the effect of synthetic and natural food additives in either their single or two fold treatment doses to prove their effect on the biological and physiological behavior in experimental rats. Saccharin was used as synthetic sweetener in comparison to sorbitol, while tartrazine was examined as synthetic colorant in comparison to carmine. BHT was tested as synthetic preservative and vanillin was examined as synthetic flavor in comparison with clove oil as natural preservative and flavor. Results showed significant increase in RBCs count and Hb levels and significant decrease on WBCs count when rats were fed on synthetic additives. No significant changes with natural food additives were noticed. Synthetic food additives led to a severe increase in AST, ALT, gamma-glutamyl transferase and alkaline phosphatase activities and creatinine, uric acid and bilirubin levels by comparing with their natural ones. However, no significant increases were noticed by using natural ones. In addition, synthetic food additives showed chromosomal abnormalities and genotoxicity in bone marrow cells in comparison with the corresponding natural ones.

Key words: food additives, rats.

FOOD SECURITY IN TERMS OF IMPROVING CROP WATER PRODUCTIVITY IN SOME ARAB COUNTRIES

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Abstract

Food security is one of the essential elements of national security and self-sufficiency in major food commodities. Arab countries import about half of their food requirements, and they are considered to be major importers of grain in the world. On this basis, Arab countries, particularly those with large agricultural capabilities, have worked on achieving self-sufficiency and reducing the food gap, therefore implementing many national plans and programs to increase production and productivity within the agricultural sector. Water availability in the Arab region is a critical issue as this region has 5%of the world's population having access to merely 1% of the world's total water resources. According to the estimates given by the United Nations, around 12 Arab countries suffer from severe water shortages. The available renewable water resources per capita amount to less than 500 m^3 per year. In general, the majority of Arab countries have a shortage of rainfall, so their agriculture is almost entirely dependent on irrigation. Socio-economic growth is therefore closely linked to well-planned improvement of irrigation. The food consumption pattern is expected to change dramatically during the next 20 years in response to increases in population, income per capita and changes in consumer preferences. This study provides evidence on the importance of studying the food security alongside water poverty. Having water scarcity contributing to nearly half the variation in food security will have important implications on policies, research, and investment. The agricultural sector faces the challenge to produce more food with less water by increasing crop water productivity. Higher water productivity results in either the same level of production using less water, or higher production with the same amount of water, so this is of direct benefit for other water users. This paper contributes to the debate and aims at explaining the efficient use of water for food production and identifying opportunities and challenges to produce more food with less water by increasing crop water productivity. It is necessary to have strategies and regulations that guarantee the right of the Arab states to achieve food security for their people.

Key words: *Food security, water productivity, food consumption, water scarcity*

PROBIOTIC EFFECT ON REDUCEING EGG CHOLESTEROL

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Abstract

The objectives of the present study were to evaluate the cholesterol-reduction effect of Lactobacillus Acidophilus as probiotic in laying hen. In the present study, one hundred-eighty-nine 40-wk-old laying hens (Hy-line) were randomly assigned into 3 groups with 3 replicates of 21 birds each, and fed diets supplemented with 0.00, 0.10 and 0.20% LactobacillusAcidophilus. Layer performance, plasma lipid profile and liver and egg yolk cholesterol.Egg production was not affected during the 6-wk of bacterial feeding trail, but Lactobacillus Acidophilus, at the level of 0.20%, significantly ($P<0.05$) improved egg weight and feed consumption, and significantly reduced the feed conversion ratio at the levels of 0.10 and 0.20%. Even though LactobacillusAcidophilus at the levels of 0.10 and 0.20% significantly decreased the plasma LDL-cholesterol by 10.9 and 16%, respectively and increased plasma HDL-cholesterol by 9.6 and 10.6%, respectively, compared with control, the changes in plasma total cholesterol concentration were not significant. Furthermore, the results showed that the cholesterol concentrations of liver and egg yolk were reduced significantly ($P<0.05$) when compared to control group for hens fed diets supplemented with 0.10 and 0.20% Lactobacillus Acidophilus. In conclusion, Lactobacillus Acidophilus showed cholesterol reduction effect in plasma, liver, and egg yolk. Therefore, Lactobacillus Acidophilus may be a good candidate for commercial production of low cholesterol eggs along with positive impacts on hen-laying performance.

Keywords: *laying hens, Lactobacillus Acidophilus, cholesterol, production performance.*

EVALUATION OF SOME BIOTIC STRESS AGENTS RALSTONIA SOLANACEARUM ON GROWTH OF POTATO PLANT, IN CONDITIONS OF ARTIFICIAL INOCULATION

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Abstract

Laboratory and greenhouse experiments were conducted within the Potato Brown Rot Project (PBRP) in Giza, Egypt, to evaluate some strains of **biotic agents** of the pathogenic bacteria *Ralstonia solanacearum* that causes potato brown rot disease. A strain of pathogenic bacteria was isolated from naturally infected potato tubers and identified by PCR and the real-time technique to *Ralstonia solanacearum* race 3 biovar 2. The Results of the antagonistic activity of the tested bio-agents against *Ralstonia solanacearum* showed that all the tested strains exhibited the antibacterial effect against *Ralstonia solanacearum* with variable degrees. In greenhouse condition, in non-sterilized soil, the biocontrol agents significantly stimulated the plant growth of both Draga and Spunta varieties of potatos. Shoot and root dry weight, as well as root length and shoot height, were significantly increased when the potato plants were inoculated with the biocontrol agents either in a single inoculum or in combination. The treatments that received a mixture of all tested biocontrol agents (*Bacillus circulans, Bacillus polymyxa, Bacillus pasteurii, Bacillus megaterium and Pseudomonas fluorescence*) were the superior among the other tested treatments. A positive response was recorded in the NPK-content of the plants as a result of inoculation with the biocontrol agents of PGPR strains.

Key words: *Draga and Spunta potato varieties, biotic agents, Ralstonia solanacearum, antagonistic activity, sterilized soil.*

COAT PROTEIN GENE OF NEW ISOLATE OF CUCUMBER MOSAIC VIRUS INFECTING BANANA IN EGYPT

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Abstract

Banana plants showing typical mosaic and yellow stripes on leaves as symptoms were collected from Assiut Governorate in Egypt. The causal agent was identified as *Cucumber mosaic virus* (CMV) on the basis of symptoms, transmission, serology, transmission electron microscopy and reverse transcription polymerase chain reaction (RT-PCR). Coat protein (CP) gene was amplified using gene specific primers for coat protein (CP), followed by cloning into desired cloning vector for sequencing. In this study the CMV was transmitted into propagation host either by aphid or mechanically. The transmission was confirmed through Direct Antigen Coating Enzyme Linked Immuno Sorbent Assay (DAC-ELISA). Analysis of the 120 deduced amino acid sequence of the coat protein gene revealed that the EG-A strain of CMV shared from 97.50 to 98.33% with those strains belonging to subgroup IA. The cluster analysis grouped the Egyptian isolate with strains Fny and Ri8 belonging sub-group IA. It appears that a high incidence of CMV infecting banana belonging to IA subgroup occurs in most parts of Egypt.

Key words: *Banana, CMV, transmission, CP gene, RT-PCR.*

REPELLING AND ATTRACTING EFFECT OF SOME PLANT EXTRACTS AGAINST THE MONACHACARTUSIANA LAND SNAIL

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Abstract

The terrestrial Mollusca, including snails and slugs, are destructive agricultural pests causing economic damage to a wide variety of plants, including horticulture field crops and forest plants.A laboratory experiment was conducted to evaluate the repelling effect of nineteen plant extracts 3% concentration on *M. cartusiana* adults. The data showed that four plant extracts (Calendula, Seena-P, Black cumin and Clove) had high repelling effect to snails after one and six hours [(93.33 and 100%), (86.67 and 80%), (80 and 93.33%), and then (40 and 80%)],respectively. Six plant extracts (visnaga fruit, thyme, lavender, seena-L, belladonna, and garlic) had moderate repelling effect. Two plants withlow repelling effect, colophony (6.67 and 26.76) and nutmeg,were attractive after one hour. Mustard exhibited high repellency after one hour, but after six hours neither repellent nor attracting effect was observed.

Keywords: *terrestrial snails, plant extracts, repellency, Monachacartusiana.*

MINERAL LEVELS IN SOME WHITE CHEESE COLLECTED FROMKAFR EL SHEIKH GOVERNORATE (EGYPT) DURING RIPENING AND STORAGE IN BRINE

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Abstract

Concentrations of elements (Ca, Mg, k, Pb, Cu, Fe and Zn) in white cheese samples were analyzed using flame and graphite furnace atomic spectrometry after microwave digestion. The cheese samples were ripened and stored (5°C) in brine for 4 months. The concentration range of these elements in the cheese samples was found to be (mg/ 100g): Ca 150.0- 210.0, Mg 19.0-37.0, K 20.0-54.1. While the rages of the trace elements were (µg/100g): Pb 14.0-33.0, Cu 11.0-18.0, Fe 420.0-870.0 and Zn 340.0-860.0.

Keywords: *Minerals, Trace elements, white cheese, health.*

RESISTANCE OF SORGHUM GENOTYPES TO THE RICE WEEVIL, SITOPHILUS ORYZAE (L) (COLEOPTERA: CURCULIONIDAE)

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Abstract

Sorghum is the main source of calories and protein in diet of many people in the regions of Africa and Asia. Despite its multiple importances, *Sitophilus oryzae* is the most important storage pest of sorghum. This study aimed at evaluating the resistance of five commonly used sorghum varieties and eleven advanced sorghum genotypes against the rice weevil in laboratory conditions. The level of resistance of these varieties was clarified based on the Dobie index of susceptibility. The result of the study indicated that only two advanced varieties, "Lalo" and "Chemeda" had the lowest index of susceptibility and grouped as resistant varieties. Weevils grown on these resistance varieties produced a small number of progeny, had a long developmental period, and a low percentage of seed damage and seed weight loss. Genotypes, Acc#8, Acc#17, Acc#19, Acc#2, Acc#5 and Gammachu were grouped as moderately resistant. Percentage seed damage, weight loss and the number of progeny emerged were significantly correlated with the susceptibility index, but inversely correlated with seed germination. Those resistant varieties, "Lalo" and "Chemmeda", attained the original germination percentage, but the remaining genotypes showed low seed germination. Growing of those resistant varieties, therefore, is cost effective and environmental friendly and reduces grain damage caused by *Sitophilus oryzae*

Key words: *Genotypes, Seed damage, Sitophilus oryzae, Susceptibility index, Resistance, Variety*

PREVALENCE OF THE TARO LEAF BLIGHT (TLB) DISEASE IN THE BIBIANI-ANHWIASO-BEKWAI DISTRICT OF GHANA

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Abstract

A study was conducted in the Bibiani-Anhwiaso-Bekwai district in the western region of Ghana to assess the prevalence of the taro leaf blight disease. The study comprised of a field and household survey. Thirty farms from five communities, namely: Bibiani, Domineabo, Anhwiaso, Asawinso and Bekwai, were randomly screened for leaf blight incidence and severity. Questionnaires were also used to assess the level of awareness and perception of the farmers in the communities on the taro leaf blight disease. The result from the study showed that the incidence of the taro leaf blight disease in the district was very high,ranging from 87% to 93%, while its severity was between 39-45%. There was no significant difference in the incidence and severity of the taro leaf blight disease among the various communities in the Bibiani-Anhwiaso-Bekwai district. All the farmers were able to identify the TLB disease and give some description of its symptoms, but majority (60%) of the farmers did not manage the disease. The few (37%) that managed the disease used fungicides and pruning of infected leaves and plants. Taro leaf blight reduced their production as well as their income and,it is thereforeimportant to develop strategies to manage it properly.

Keywords: *Taro leaf blight disease, questionnaire survey, households.*

IMPROVEMENT OF NATIVE MELON (FIROOZI) BY FIRST SELECTION OF S1 LINES IN ORDER TO MAKE SUPER POPULATIONS

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Abstract

In order to improve "Firoozi" nativ melon of Sistan a selection breeding program was conducted in the period from 2010 to 2014 cropping seasons at Zahak Agriculture Research Station in Iran. Some properties of melon fruit of firoozi that it is native population in sistan region. An experiment with the implementation of the first selection lines (S1) for 4 years (2010-2014) was conducted to produce improved population at the Agricultural Research Station of Zahak. In this experiment, 1000 plants which were growing from the base population and selected of early fruiting flowers, selfing of flowers were made and first lines from selfed flowers were planted in randomised complete block design by 3 replications. After selecting of valuable treatments for yield, flesh thickness and sugar percent, mixing of seeds from last year (second year) was done and planted in order to make open pollination in an isolated location. Finally, in the fourth year small amount of seed from third year along with base seeds were planted to compare performance of yield, sugar percent and flesh thickness. The result showed that the improved population 2.2 t/ha compared to base population increased in yield and improved population had a high record for flesh thickness and sugar percent. The most correlation coefficient was obtained between fruit weight and plant yield (0.71^{**}) but the relation between fruit width and yield was negative and significant (-0.51^{**}), indicating that fruits with bigger width had less fruit weight and that caused low yield.

Key words: *Melon, S1 Family selection, TSS, Yield.*

DEVELOPMENT AND EVALUATION OF A CEREAL CAPACITIVE MASS FLOW SENSOR

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Abstract

The first stage and most advanced process in precision agriculture is the real time yield monitoring by the use of sensors. The aim of this study was to develop and investigate the effect of input voltage frequency, mass flow rate and velocity of product on the performance of a developed mass flow capacitive sensor. A test rig was developed and equipped with measuring system. In order to measure the mass flow rate of cereal, two aluminum plates with a thickness of 2 mm and dimensions of 800×100 mm were used as sensor. The paddy variety of Ghaem was used as dielectric material between the plates of the capacitor. The treatments were mass flow rates (0.8-2.4 kg/s), frequencies (100-700 kHz) and conveyor velocities (0.5-1 m/s). The experimental data were analyzed with factorial test based on a completely randomized design in three replications. Results showed that the effect of mass flow rate, input voltage frequency and their interactions had significant effect on the sensor capacity ($p \leq 0.01$). The product velocity had no significant effect on the sensor performance. The input voltage frequency had an inverse effect on the capacity of sensor. By comparing relationship between capacities of mass flow sensor at different levels of frequency, a relatively high accuracy relationship between paddy mass flow rate and capacity of sensor was observed. The best frequency range to measure the mass flow of paddy was 300 kHz. Results of this research can be effective on the design of an online system to measure the mass flow rate of paddy in harvesting, storing and processing systems.

Keywords: *Capacitive sensor, Frequency, Mass flow, cereal, Conveyor velocity.*

INFLUENCE OF COLD STRESS ON PHOTOSYNTHESIS STATUS OF DIFFERENT *STEVIA REBAUDIANA* CULTIVARS

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Abstract

In the present study, the photosynthesis inhibition of different *Stevia rebaudiana* Bertoni cultivars was investigated in response to cold stress. Nine *S. rebaudiana* cultivars were achieved from the EUSTAS Stevia Gene Bank under accession number of 1 to 9. The plants were exposed to cold stress at 5 ^{0}C for one month while the control plants were grown at 25 ^{0}C, with controlled growth condition. The maximal quantum yield of photosystem II (Fv/Fm) has been used as an indicator for stress detection in plants. Cold stress significantly decreased Fv/Fm values in all cultivars while some cultivars showed more reduction in that ratio than the others. According to Fv/Fm results, the 9 cultivars were grouped in two high and low cold-sensitive Stevia cultivars. In response to cold stress, the high cold-sensitive group also showed higher reduction in net-photosynthesis (PN), intercellular CO2 (Ci), the efficiency of the two photosystems I and II (PI), water use efficiency (WUE), chlorophylls a and b and carotenoids than the low cold-sensitive group. The significant difference in evaluated photosynthesis parameters between the groups can be used in identifying *Stevia* cultivars differencing in cold sensitivity. According to the results of this investigation, the identified low cold sensitive cultivars of *S. rebaudiana* (numbers 1, 2, 3, 4 and 7) may serve as valuable cultivars for culture in area with cold winter.

Keywords: *Cold stress, Photosynthesis, Stevia rebaudiana.*

ANTIMICROBIAL PACKAGING USING NATURAL POLYSACCHARIDES (CHITOSAN, ALGINATE AND CARRAGEENAN) WITH ESSENTIAL OILS

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Abstract

The use of petrochemical substances for food packaging is a serious environmental hazard. For this reason, alternative solutions should be found to be sustainable. For solving this problem, recent studies focus on the development of biodegradable materials. In recent years, the use of biodegradable polymers such as proteins, fats and polysaccharides (chitosan, alginate, and carrageenan) has increased in packaging. Essential oils are an interesting ingredient to add to biodegradable composite materials. Essential oils are used as active ingredients, due to their natural origin and functional properties (antimicrobial properties), with the aim of increasing the shelf life of food in active packaging. Depending on how the antimicrobial agents act, antimicrobial packages are classified into three groups of depleting packaging, absorbent packaging and non-moving packaging. In depleting packaging, antimicrobial agents are released from packagingto food. This release is carried out in either controlled or uncontrolled manner. In controlled release, the antimicrobial agents present in the packaging eliminate in a controlled manner and kill microorganisms. In absorbent type, antimicrobial agents present inpackaging, absorb moisture and oxygen, preventing the growth of microorganisms.

Keywords: *Packaging, Biodegradable, Antimicrobial, Shelf life.*

FIRST RECORD OF ZUCCHINI YELLOW MOSAIC VIRUS AND ITS DISTRIBUTION IN MID OF IRAQ FOR TWENTY YEARS

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Abstract

The emergence and spread of yellow mosaic disease in cucurbits were first recorded in Iraq. To diagnose the cause agent of this disease, the symptoms appeared on the detection plants were compared with that of the important viral diseases. Infecting cucurbits were used. Also, transmission methods of the disease causal and family range of the causal agent were detected. Results revealed that of among 24 species only 9 species were infected. Seven of them were of cucurbits with observed systemic yellow mosaic, blisters, with leaf and fruit malformation, but only *Luffa acutangola* showed chlorosis. Cucurbits chlorotic local lesions were developed on *Chenopodium amaranth color*. Firstly, registrant of red frame around 1-5 mm brown necrotic lesion on *Euphorbia pepus* old leaves was performed. The pathogen was mechanically, aphids, and seeds transmitted. Since compression of these identification methods with the previous studies, it was indicated that the causal agent of this disease was Zucchini Yellow Mosaic Virus (ZYMV). Test via standard antiserum obtained from ICARDA research center indicated this result. Then antiserum of this virus was produced in Newzeland white rabbits and used to determine the distribution and infection percent in mid region of Iraq from 1996 to 2016. The prevalence of the disease in the fields of the central region of Iraq since 1997 to 2016 had varied rates of infection during these years. Peak was in the first years.

Keywords: *ZYMV, Cucurbits viruses, Squash diseases, Virus identification.*

NEW RACE OF SQUASH PARTIALLY RESISTANT TO ZUCCHINI YELLOW MOSAIC VIRUS

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Abstract

Zucchini Yellow Mosaic is a very devastating disease becoming a limiting factor of squash productivity especially in spring and summer, and some time in autumnin most regions of the world. Genetic resistance by inducing resistant cultivars is the best method of diseases control especially of viruses. A program of re-origining of some squash hybrid and cultivars by self-pollination for several successive generations was applied. Different aspects of (ZYMV) resistance were differentiated in different variants. In one of these aspects, mosaic symptoms were developed slowly, fruits color and shape variation were late. Genotype yield saving degree, genotype yield saving efficiency, and genotype total health yield percent compared with control were calculated and found to be 0.566, 56.6%, and 61.4% respectively. Genetic segregation in the second generation of this genotype hybrid with another race has not had this trait, which can be explained by the fact that this resistance character has been controlled by one partially dominant gene of two alleles.

Keywords: *Cucurbits breeding, Virus resistance, ZYMV, Squash diseases.*

NEW RACE OF ZUCCHINI YELLOW MOSAIC VIRUS VECTOR RESISTANCE IN SQUASH

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Abstract

Summer squash productivity is largery affected by virus infection. It is highly virulent, fast spread, and has worldwide distribution. Different programs were put to resist or control or reduce their infections damage on plants and/or fruits. In a program of secondary characters resistance of Zucchini Yellow Mosaic Virus, a variant of downy uppersurface of leaves were elected, for this trait made disturbance and repelling of virus vector insects,reducing insects visit and transmission of the virus to the plants and late theinfection, elongating the period of disease distribution and development, leading to increase in the plants productivity period. Efficiency of this character to repelling aphid insects and mites were determined and found to be about 71.3% for aphids and 100% for mites. This variant was selected and developed to new race of ZYMV insect vector resistance origin. Number of genes responses of this character and their heritability nature was also determined and found to be due to response of two genes. This genotype was developed to pure race as a source of this virus secondary gene resistance. Other variants of different desired agronomic traits were also selected.

Keywords: *Cucurbits breeding, Virus resistance, ZYMV, Virus vectors resistance Squash diseases.*

FIRST RECORD OF THE INFECTION BY THE RACE UG99 OF BLACK STEM RUST OF GRAMINEOUS CROPS IN IRAQ

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Abstract

Two highly sever abnormal infections in such aspect that they were not seen before and they were more different than the ordinary black stem rust was observed in Tabitha experimental station in Baghdad and other surveyed governorates on different winter wheat cultivars. The first one was in the year 2000 where the race UG99 was not so known in the world in that time. The pastures of that infection covered nearly all the foliage of some plants of four introduced Pakistanis winter wheat cultivars. The second was observed in the last few days of April 2013 on other winter wheat cultivar "Xenon". In the two states pastures of these infections were mostly more elongated (1-20 mm) and thicker (5-10/cm^2) than the ordinary black stem rust, and some of them had continuously rapid grown in single striate line, or the pastures closely attached around the stem up to the top of plants to about 10 cm or more. On spring wheat and barley two types of infection symptoms of black stem rust were observed in the field. The first type preliminary seemed as pointed spots and then elongated (1-5mm), with thickness of (1-3 pastures/cm^2), orange to red - brown then black pastures color, that were of the ordinary black stem rust which might see yearly. Other type of infection wasof the same color, but was with more pastures thickness, mostly longer (2-10 mm) sometimes 20 – 30 mm or more, and somewhat later than the ordinary black stem rust. Inoculation by a single pasture isolate technique in two experiments was applied in the field, as well asin controlled greenhouse on a spring barley and wheat and winter wheat cultivars. Two types of infections of black stem rust were differentiated on winter wheat, the first was of the ordinary black rust which on field had symptoms in length and density as it was mentioned above, but the other type was characterized with more severity, activity and virulence, with longer and thicker pastures similar to UG99 infection type which appeared in some African and Asian countries in the last two decades. But this strange severe infection on winter wheat was different than that on spring wheat and barley as it had different pastures density, length, and virulence, or in other word it was different than the ordinary black stem rust but was not easily differentiated on spring wheat and barley.

Keywords: *wheat and barley diseases, rust diseases, black stem rust, UG99, wheat epidemic diseases.*

INTRODUCTION OF FORAGE ALTERNATIVES AND ASSESSMENT OF THEIR SENSITIVITY TO FLUORINE IN THE ENDEMIC AREA OF FLUOROSIS: CASE OF THE SEMI-ARID ZONE OF BENI MESKINE, MOROCCO

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Abstract

Marginal areas in semi arid region in Morocco are characterized by low and erratic rainfall, poor soils and crop production systems with low potential. Beni Meskine is one of unfavorable regions in Morocco. It is characterized by difficult conditions negatively affecting agricultural productivity by lack of forage and low contribution of food products for livestock. The aim of this study was to introduce forage alternatives (legumes) and quantify and identify the level of current use to identify best management strategies to improve animal production. For this, the mixture (vetch/oats) (Vesce/triticale) (Vesce/vetch/Barley) and (pea/barley) was installed in 13 farmers on an area of 2 ha. Fodder biomass mixtures Vesce/Barley, Peas/barley, vetch/oats and vetch/Triticale exceeded 8500 kg of Dry Matter/ha. The proportion of legumes in the mixtures was satisfactory. Atriplex, famous for its high forage value, is very good for sheep. This is a promising approach for rangeland rehabilitation suffering from overexploitation.The use of alley cropping is a form of struggle against the exploitation and thus desertification. This study reveals the successful rehabilitation of degraded grassland ranges. As for the fluoride content, in February it was between 0.3 ppm and 4 ppm and in April it was 0.18 ppm and 4.3 ppm. For the pea, the fluorine content was between 0.06 ppm and 4.1ppm in February and in April it varied between 0.6 and 4.11 ppm, without necroses having appeared. Their fluorine levels far exceed those usually accepted for mineral supplements.

Keywords: *Semi-arid zone, Fluorine, Fluorosis, Fodder alternatives, Béni Meskine.*

POPULATION TREND OF MYZUS PERSICAE (SULZER) AND ITS ASSOCIATED NATURAL ENEMIES IN DIFFERENT PEACH VARIETIES IN SWAT VALLEY, PAKISTAN

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Abstract

Research work regarding the population trend of M. persicae and its associated natural enemies in 12 weeks period on various peach varieties was conducted at Agricultural Research Station (North) Mingora, Swat Valley, Khyber Pakhtunkhwa Province-Pakistan, during 2014. Among all varieties, Spring Crest was found comparatively the best by recording lowest number of M. persicaei. e. 1.9 mean numbers per 30 cm terminal branch area were recorded. Peak infestation of M. persicae was recorded in Week-7 (29^{th} March- 4^{th} April) in almost all interactions of varieties × time intervals. Just like the population of M. persicae in relation to time intervals, the recorded natural enemies population was increased with the passage of time up to week-7, where highest mean population 3.6, 3.0, 3.6 was recorded of Lady bird beetle, Green Lacwing, Syrphid fly, respectively. The highest rate of percent parasitism (17.45) was recorded in the week-10. The recorded response of varieties towards M. persicae showed minimum or no adverse/detrimental effect on natural enemies among the tested varieties which has opened the window for further investigations on these varieties.

Key words: *Peach varieties, Population trend, M. persicae, Lady bird beetle, Green Lacwing, Syrphid fly, Parasitoid, % parasitism rate.*

TOXICITY AND ANTIOXIDANT POTENTIAL OF *DALBERGIA SISSOO* HEARTWOOD EXTRACTIVES AGAINST *HETEROTERMES INDICOLA*

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Abstract

Due to the negative impacts of current wood preservatives, there is a need to develop environmentally safe methods to control termites. Many researchers have explored heartwood extractives of naturally durable trees as toxic or repellent to termites. Some researchers have also proposed that both the toxicity and antioxidant properties of extractives affect termites. The aim of this study was to search the toxicity and antioxidant/free-radical scavenging potential of extractives of *Dalbergia sissoo* heartwood. Toxicity of extractives were investigated for their antitermitic activities against *Heterotermes indicola.* Heartwood extractives were removed from wood shavings by soxhlet extraction using (2:1) ethanol: toluene as the solvent system. Filter paper bioassay was conducted against termites to observe concentration dependent feeding response and mortality of termites. *D. sissoo* extractives were toxic to *H. indicola* with a LC_{50} 3.89 mg/ml. All extractives concentrations also showed repellent activities against termites. In DPPH radical-scavenging assay, 50% inhibitory concentrations (IC_{50}) for positive control were 8.17 and 42.63 µg/ml for quercetin and BHT respectively. Heartwood extractive of *D. sissoo* showed maximum % inhibition with the lowest IC_{50} (28.83 µg/ml). Both compounds showed concentration dependent radical-scavenging activities unlike *D. sissoo*. Extractives of *D. sissoo* showed more % inhibition as compared to positive control (BHT).

Key words: *Heterotermes indicola, Heartwoods, Toxicity, antioxidant, DPPH.*

COMPARATIVE EFFECT OF DIFFERENT PLANT EXTRACTS ON OKRA PESTS

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Abstract

Okra is a major crop, cultivated all over the tropics and used as a vegetable. Different reasons lead to decrease in okra yields, among which insect pests are the major ones. The experimental research was carried out in the agricultural fields of the Department on Plant Protection at the Sindh Agriculture University Tando Jam. during the spring season in 2016. The data indicated that comparative efficacy of the plant extracts recorded from the treated plots were found considerably different from each other and whereas the tobacco extract was more effective, followed by the neem extract, hing and eucalyptus. After a 48 h treatment of different plant extracts, pest population turned started to decline, except in the neem extract, in case of which the decline was observed after 24 hrs and it was significantly greater than in control. The data showed that the maximum effect of the tobacco, hing extracts and eucalyptus on the whitefly, jassid and aphid was found after 48 hrs and then after 24 hrs, 72hrs and one week respectively. Afterwards, they showed a gradual decrease against the test insects. The tobacco extract showed a greater effect over the other and eucalyptus exhibited a negligible effect in reducing pest numbers. In conclusion, an attempt was made to evaluate the role of plant extracts in pest activity. The results reported here open the possibility of further investigations on the efficacy of natural product extracts.

Key words: *plant extract, okra, pest*

A FRUIT FLY SPECIES, *DACUS PERSICUS* (HENDEL) WITHIN THE GENUS, *DACUS FABRICIUS* (DIPTERA: TEPHRITIDAE: DACINAE) FROM PAKISTAN

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Abstract

Fruit flies have a great economic importance due to threat to food security around the world and also in Pakistan. Their incidence reduces both yield and quality of fruits and vegetables. The females puncture the fruits and vegetables with their syringe-like ovipositor and lay eggs just under their skin. The maggots after hatching tunnel into the fruits and vegetables for feeding on the pulp, as a result rotting starts at the puncture points, thus render hosts unfit for human consumption. As a result of broad trapping program for the collection of fruit flies fauna of Pakistan, adults or larvae samples of fruit flies were collected from different localities. After sampling, to characterize fruit fly fauna involved, the collected samples were brought to the laboratory for their species identification. In this study, based on extensive literature records, the presence of one fruit fly species *Dacus persicus* (Hendel) (Diptera: Tephritidae: Dacinae) belonging to genus *Dacus Fabriciu s*was recognized. This species was described and illustrated on the basis of morphological characters, supported by data on its ecology and geographic distribution. Information was also given on host plant and location of type specimen, distinguish remarks and diagnosis were included as well.

Keywords: *Dacus, fruit flies, loss, Calotropis procera, maggots.*

MEASUREMENT OF UPTAKE POTENTIAL OF ASPERGILLUS NIGER AGAINST HEAVY METALS

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Abstract

The present study reports the biosorption potential of chemically pretreated mycelial biomass of fungus Aspergillus niger. Fungal biomass was pretreated with different types of alkaline/salts (NaOH, $NaHCO_3$, Na_2CO_3, NaCl & $CaCl_2$,), acids (HCl & H_2SO_4) and detergent. Pretreatment of biomass with Na_2CO_3 and NaOH was conducted to increase or maintain adsorption efficiency and capacity in comparison to untreated biomass. Pretreatment with $NaHCO_3$, detergent, NaCl and $CaCl_2$ significantly reduced (10-40%) metal sequestering efficiency of the adsorbent. Whereas, acid treatments resulted in a drastic loss (80%) in metal uptake efficiency of the biomass. Amongst various pretreatments, Na_2CO_3 could be used efficiently for the removal of Ni (II) and Cu (II) ions from aqueous solution using A. niger.

Keywords: *Aspergillus niger, alkaline, acid, detergent.*

QTL MAPPING OF DOUBLED HAPLOIDS FOR PLANT HEIGHT AND PHENOLOGICAL AND AGRONOMICAL ATTRIBUTES

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Abstract

Drought, one of the major multidimensional environmental constraints to plant growth and productivity, impacts wheat yield in arid and semi-arid regions of the world. Synthetic hexaploids (SH) are considered as a novel source of germ plasm under hostile environments because of their potential to cope with biotic and abiotic stresses. The research has been designed to one hundred forty double haploids (DH) were evaluated for different phenological attributes at anthesis under drought stress. QTL detected under control and drought stress conditions for the polygenic inheritance and their interaction with the environment. QTL for 1,000-kernel weight, plant height, physiological maturity, spike length, and days-to-heading under drought stress were evaluated. Four minor and four major QTLs for 1,000-kernel weight in a DH mapping population were identified on chromosomes 3D, 7B, 5A, 5B, and 3B under drought stress at anthesis. QTL for grain number were identified on chromosomes 1B, 2A, 3B, 5A, 7A, and 7B under preanthesis drought stress and one major QTL for spike length (QSl.wwc-2D-C9) under controlled conditions was on chromosome 2D. One major QTL (QDh.wwc-5A-S9) under drought stress explained 12.76% of the phenotypic variation at an LOD score of 4.54, flanking in the vicinity of Xbarc10–Xwms71. A second and third major QTL under drought stress were identified on chromosomes on 7A and 3B, respectively, and collectively explained 21.08% of the phenotypic variation. This QTL explained 10.23% of the phenotypic *variation at an LOD score of 6.5. Chromo*somes 5A and 5B are considered to be important genomic regions for QTL for 1,000-kernel weight, plant height, physiological maturity, spike length, and days-to-heading under drought stress.

Key words: *QTL Mapping, Drought, Wheat*.

QUALITY ATTRIBUTES OF FLAVOURED ALOE VERA READY TO SERVE (RTS) DRINK

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Abstract

Nowadays therapeutic ready to serve (RTS) drinks that are based on the blends of natural juices extractsare getting the great attention, which reflects the faster growing awareness about these products in market place.Objective of this study was to formulate and prepare thealoe vera flavored RTS drink. Aloe vera juice was mixed with water, and three different flavours *i.e.* mango, strawberry and peach were added to make the aloe vera flavored drink. Different concentration of aloe vera juice and water were blended to formulate five different treatments *i.e.* T1 was 14% aloe vera 86% water, T2 17% aloe vera and 83% water, T3 was 20% aloe vera with the 80% water, T4 was consist of 23 aloe vera with 77% water and T5 had 26% aloe vera with 74% water. Aloe vera flavored drink was analyzed for mineral contents, vitamin C concentration and reducing sugars. Moreover, the pH, acidity and total soluble solids of the drinks were also determined. Finally, the data was subjected to statistical analysis to evaluate the level of significance. Results showed that with the increase of aloe vera juice in the formulation of RTS drink, the acidity was increased from the 0.25 to 0.34, °Brix was increased from 2.49 to 2.60 and pH decreased from 3.67 to 3.59. It was concluded that T4 was the best RTS drink containing 23% aloe vera and 77% water showing highest organoleptic characteristics.

Key words: *Flavoured drink, sensory characters, aloevera, ready to serve.*

DEVELOPMENT AND EVALUATION OF ALOE VERA-PAPAYA FUNCTIONAL JUICE

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Abstract

Aloe vera (*Aloe barbadensis Miller*) from the *Lileacea* family is conventionally used as a curein the contemporary society. The plant of aloe vera has firm, plump, dim green, spear formed leaves containing a clear gel in a focal adhesive mash. The phytochemical properties of the Aloe vera gel comprise nearly 95% of water that contains 75 important nutrients, 210 active mixtures, 17 amino acids, 19 minerals, 11 vitamins, sugars, anthoaquinones of phenol mixes, saponins, lignin, amino acids and sterols,etc.The gel also has marvelous properties like wound healing, anti-inflammatory, anti-diabetic, laxative, anti-microbial and anti-fungal effects. The papaya (*Carica papaya L*.) belongs to the *Caricaceae* family that is commonly found in tropical and subtropical countries. The portion of ripe papaya fruit has both micro and macro nutrients. The objective of this study was to use the aloe vera and papaya juice to formulate a suitable aloe vera-papaya drink. The aloe vera-papaya drink was analyzed for proximate composition, mineral contents, vitamin C concentration, anti-nutritional substances like tannin and saponins, reducing sugars, and for flavonoids occurrence. Moreover, pH, acidity and total soluble solids of the newly developed juice were also analyzed. Finally, the data were subjected to a statistical analysis to evaluate the level of significance. The results showed that the recipe containing 80% aloe vera and 20% papaya pulp showed good quality and the highest sensory scores.

Key words: *Functional food, aloe-vera, papaya, organoleptic, physico-chemical properties.*

COMPARISON OF BLACK POINT INCIDENCE IN NORTHWESTERN WHEAT PRODUCTION ZONES OF PAKISTAN

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Abstract

Enhancing wheat production on sustainable basis will play a significant role in ensuring food security and economic growth of agriculture sector in Pakistan. Seed is a basic input in wheat production and, at the same time, one of the main pathways for the dissemination and spread of pathogens and diseases. Black point caused by *Alternaria alternata* complex is known since 1948 in Pakistan and is a serious concern to farmers and regulatory agencies. In recent years, black point incidence and distribution enhanced in wheat growing regions of the country including Khyber Pakhtunkhwa (KP) Provience located in the northwest of Pakistan. Farmer fields derived seeds of different wheat cultivars were collected during 2014 from three representative locations viz Kohat (Coordinates: 33.5834°00′ N, 71.4332°′ E), Peshawar (Coordinates: 34°00′ N, 71°32′ E) and Swat (Coordinates: 34°50′ N, 72°22′ E) belonging to southern, central and northeren zones of KP Provience, respectively. Variability in black point incidence was observed at each location while mean incidence was maximum in Peshawar (13%, N=19), which was followed by Kohat (5%, N=12) and Swat (3%, N=47). Three cultivars (i.e. Watan-94, Sehar-2006, Janbaz) common in Kohat and Peshawar had 7-24% less black point incidence in Kohat while Fakhar-e-Sarhad and Pirsabk-2005 when compared from Peshawar and Swat had 7% less incidence at Swat. Similarly, Aas-2009 had <2% incidence in Kohat while Pirsabak-2004 had 4% more incidence in Kohat when compared with Swat. Results of this study will be useful for seed procurement agencies, plant quarantine and phytosanitary, trade and wheat growers in the region.

Keywords: *Black point, wheat, seed, disease, Pakistan.*

THE INFLUENCE OF NITROGEN FERTILIZATION ON FOLIAR DISEASE S.TRITICI AND S. NODORUM FOR VARIOUS PREMIUM WHEAT VARIETIES

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Abstract

The correlation between nitrogen fertilization (N) and degree of crops disease development is a major topic, still studied at international level. Filed study was made in 2015-2016, at S.C.D.A. Drăgănești-Vlașca, in the southern central region of Romania. The climate conditions for the vegetation period were optimal for pathogen development, based on a normal specific temperatures and additional 150mm/ha precipitation, with multi-annul average. The study was conducted on 5 Premium wheat varieties (Arnold, Adesso, Gallio, Midas și Laurenzio) and an A class baking quality wheat variety (Balaton), all of them from breeding work of Saatzucht Donau Ges.m.b.H & CoKG. Six different amounts of nitrogen (N_0 = 0 N kg/ha, N_1= 30 N kg/ha...N_5=150 N kgha) were applied with fractionate application. There was no fungicide treatment applied, so that strict correlation between genetic tolerance of the wheat varieties and response to different doses of nitrogen, could be strictly observed. The infection rate of *Septoria Spp*. was 100%, for both *S. tritici* and *S. nodorum*. The obtained data show different situation for the two diseases. For Arnold, Adesso, Gallio and Laurenzio the severity was stronger for de *S tritici* compering to Balaton and Midas, where higher severity was on *S. Nodorum.* Also for more nitrogen application in the season of disease development, the severity increases along with the fertilizer quantity. By using high resistance disease wheat varieties and optimal doses of nitrogen, the pathogen severity can be reduced and also the need for fungicide treatments for *Septoria spp.*

Keywords*: Premium wheat, nitrogen fertilization, foliar disease, Septoria spp.*

COMBINED EFFECT OF ABIOTIC PARAMETERS ON *TRICHODERMA* SP. GROWTH WITH BIOCONTROL POTENTIAL ON STORED GRAIN PHYTOPATHOGENS

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Abstract

Temperature, pH, and water activity are key factors in the growth behavior, development and biocontrol activity of the fungal strains. These abiotic factors are relevant for different application in agriculture and biotechnology. *Trichoderma* spp. is well known as very effective biological mean for plant disease management. The present work aimed to establish the effects of environmental factors on the mycelial radial growth of *Trichoderma* sp. strain (isolate Tr.1) and its biocontrol capacity against stored grain phytopathogens. Also, it was evaluated the antagonistic effect of an isolate of *Trichoderma* sp. on five strains of *Penicilium* spp., *Fusarium* spp and *Botritys* sp. phytopathogens, by dual culture method. The pH used were 4, 5, 6 7, 8 and incubation temperatures were 10°C, 15°C, 25°C, 30°C, 35°C. The results of experiments showed that the most favorable pH was between 5 and 6, while pH 8 and pH 4 showed significant reduction in the growth parameters of *Trichoderma* sp. The results revealed that tested strain has grown better between 25°C and 30°C. Mycelial growth was reduced at 15°C and inhibited at 10°C. After six days of incubation at 28°C, the antagonistic capacity of *Trichoderma* sp. isolate was recorded. The results showed that *Trichoderma* sp. has high biocontrol potential as it inhibited the growth of all tested fungal strains associated with grain seeds, in percentage between 59.52% and 84.71%.

Keywords: *Trichoderma sp., biocontrol, seed grains, pathogenic moulds.*

IDENTIFICATION AND CHARACTERIZATION OF NOVEL PLANT GROWTH PROMOTING BIO-CONTROL BACTERIA

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Abstract

Plant growth promoting rhizobacteria (PGPR) are a group of bacteria which can enhance the growth of plant directly or indirectly. A large number of bacteria including different species have reported to enhance plant growth. The aim of this research was: 1) to test the bacteria *in vitro* for suppression of fungal and oomycete growth, and 2) to test selected bacteria *in vivo* for PGP with and without fungal pathogens. Fifteen bacterial isolates showed clear antagonized zones against at least one of the plant pathogenic fungi. Both of QUSA 37 and 52 and its mutants inhibited mycelium growth of *Rhizoctonia solani*, *Alternria* sp. and *Colletotrichum* sp. QUSA 45 and its mutants suppressed the growth of five fungal pathogens including *Rhizoctonia solani*, *Botrytis* sp. and *Stemphylium* sp. The isolated bacteria were defined into twenty three bacterial genera by 16S rRNA, and the most predominant genus of the bacterial isolates were *Pseudomonas* including 4 species and *Bacillus* including 6 species. To investigate *Bacillus sp*. and *P. fluorescens* and its mutants, biocontrol ability in protecting alfalfa plants against the *Rhizobium sp.* and *Botoitis sp.*, a plant growth promotion test was done. Shoots, roots lengths, and fresh and dry weight tendency of surviving plants were significantly affected by inoculated bacteria in alfalfa plants grown in greenhouse experiments. Isolates 52 and 45 and its mutants 52-M12, 45-M19 and 45-M20 gave the highest dry weight and length of shoots and roots of alfalfa plants. Furthermore, the efficiency of these bacterial isolates and its mutants against *Rhizobium sp.* was significantly higher than the control treatment. Compared to these applications of selected bacterial isolate, these results indicated that application of biological control could significantly increase the ability to control soil born fungi in alfalfa plants.

Key words: *Bacteria, plant growth, in vitro, in vivo.*

EFFECT OF SOME PLANT HORMONES ON ALBINO RATS AND THEIR EMBRYOS AND NEW BORN

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Abstract

Seventy-two fertile male and virgin female rats weighing approximately 125g body weight were used for experimentation. Females were mated in a special cage (1male/3 females) during overnight and gestation was determined in the next morning by the presence of sperm in a native vaginal smear. The pregnant rats were arranged into three groups; control, gibberellic and indole acetic acid. Each of the experimental groups was sacrificed at 14, 16 days prenatal as well as at parturition. The total numbers of embryos, congenital malformation, and resorption sites were determined. Maternal serum biochemical markers of lipid peroxidation, free radicals, antioxidants and liver function in liver, brain and eye heart of mother and their pups. Oral administration of either gibberellic or indole acetic acid at doses of 100mg/Kg for 40 days every other day and from the 1st to 14th day of gestation led to alterations in maternal hepatic tissues and femoral bone. Liver hepatitis was characterized by either cytoplasmic vacuolization of the hepatocytes with increased incidence of pyknotic nuclei. There was a marked increase of dissolution of hepatic cords with prominent dilated blood sinusoids and defined cell boundaries of hepatocytes. Numerous hypertrophied kupffer cells were detected in the sinusoidal wall. Drastic effects of maternal livers were reflected on the liver of their pups of almost identical histopathological lesions in the form of massive cell death characterized by massive necrosis of hepatocytes, distortion of blood sinusoids and abnormal congestion of blood vessels with apparent degeneration of their endothelial lining cells. The authors finally concluded that to advise farmers to reduce application of plant growth hormones in their green house to reduce their impacts on health along run of life.

Key words: *Plant hormones, albino rats, embryos.*

CORRELATION OF PHENOLIC COMPONENTS IN ORANGE AND PURPLE TOMATOES

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Abstract

Different parts of plants (roots, leaves, flowers, fruit, stem, bark) have been successfully used to treat numerous diseases. Tomato is known for its medicinal properties. The components that affect its activity are different phenolic compounds. In this paper,we compared the content of phenolic compounds between orange and purple tomatoes. In the phase of technological maturity, the selection of sample produce for the purpose of chemical analysis has been performed. The object of the paper has been to define and establish the correlation between the total phenolic compounds and their antioxidant activity in the ethanol extracts of tomatoes. Antioxidant activity is defined as the ability of neutralising DPPH radicals. Total phenols were evaluated by the Folin-Ciocalteu, and have been determined by means of spectrophotometric method. Results show that the total phenolic content was higher in the purple tomatoes (E_1), (0.1878±0.0001 gGAE/100gsample) than in orange tomatoes (E_2), (0.1175±0.0001gGAE/100g sample). High values of antioxidant activity were identified (91.70 % for$E_1$and 88.75% for E_2).

Key words: *tomatoes, antioxidant, extract*

CORIOLUS VERSICOLOR POLYSACCHARIDES IN FISH NUTRITION

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Abstract

Extract of some lignicolous fungal species (*Coriolus versicolor, Ganoderma lucidum* and *Pleurotus ostreatus*) have strongly antioxidant and antibacterial effects. Turkey tail (*Coriolus versicolor*) is a medical herb containing polysaccharides and polyphenols which inhibiting oxidative damage of many types of cells and improve immune function of the human body. Recently public interest focused on use of lignicolous fungi in aquaculture for stimulation of immunity and improvement of hematological properties of fish, especially cyprinids (Cyprinidae). Feeding experiment with dietary intake of 1g *Coriolus versicolor* polysaccharides per 1kg fish feed in 56-day period conducted on Crucian carp (*Carassius gibelio*) rearing infected by *Aeromonas hydrophylla* (one of the commonly bacterial causer of fish mortality). The obtained results confirm the improvement of general haematological properties of infected fish and decreased mortality. The higher resistance to pathogen influence, decreased use of antibiotic and prevention of water deterioration due residual contamination, confirm the use of these substances in intensive fish rearing.

Keywords: *Coriolus versicolor, polyssacharides, fish immunity*.

BIOFUNGICIDE CONTROL DISEASE IN FOREST

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Abstract

In forestry, fungus *Heterobasidion annosum* is the most damaging pathogen of conifers root in the northern hemisphere. It progresses from the root of the base of the tree, causing significant economic decay. Once established fungus infection is nearly impossible to eradicate, and it progressively spreads through contact with infected root. It is therefore necessary to develop biological measures in combating this pathogen. When the stumps begin to rot they can be colonized by a number of other pathogenic fungi. For this reason, rangers usually treated surface grinders with mildly toxic chemicals, such as urea, boron compounds or ammonium sulphates. This can be environmentally undesirable. These treatments may be replaced by a highly efficient biological control system on the basis of Rotstop - *Phlebiopsis gigantea* fungus, having a low parasitic effect without threating to a healthy tree. If immediately after cutting we treat the stump with *Phlebiopsis gigantea*, then we can prevent infection with *H. annosum*, and there is no need of chemical treatments. *Phlebiopsis gigantea* grows readily in laboratory culture, producing a large number of particles, such as the dispute caused by the fragmentation of hyphae. In this biopreparate RotStop spores were placed in a sugar solution, in order to raise the osmotic potential, and to prevent the sprout during storage, and then were mixed with paint and sealed in pouches. They could be be stored up to 6 months in the refrigerator. In application, the contents of the bag had to be diluted with water and sprayed with a fresh surface of the stumps. The fungus quickly forms colonies, a carpophores visible a year later. *P. gigantea* has an interesting mode of operation as a biological control agent.

Keywords: *Biofungicides, Efficacy, Spruce, RotStop, Heterobasidion annosum*

FOOD SAFETY AND HARMONIZATION OF REGULATIONS WITH EU, BENEFIT FOR BALKAN COUNTRIES

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Abstract

From the very beginning of EU, former European Union (EU) common agricultural policy was one of the most important policy areas, which had a large part in EU budget, and today is 40%. The objectives of the common agricultural policy as time progressed, and today it provides a sustainable agricultural production. EU agriculture paradigm is "provide consumers with high standards for food and taxpayers respond to the requirements of the standards in terms of environmental protection, occupational health and responsibility. Knowledge of policies on food safety in EU is important for the Balkan countries, because during the preparation for accession to EU, countries must establish a harmonization of all laws and regulations relating to the chain of food production in all EU member states. The acquis in this field is very wide and leads the motto of "from farm to fork", which just explains that the European Union has its own legislation and policies regulate the whole chain of production, distribution, sale and consumption of food. This integrated approach to food safety aims to provide a high level of safety and food safety, animal health, animal welfare and plant health within EU, as well as to contribute to the efficient functioning of the market. Food safety is a challenging and complex power in the negotiation process for accession of the Balkan countries in EU. Strengthening the control system is the key to the production of safe and quality food for consumers, both in the domestic, national and foreign markets.

Keywords: *Food safety, consumers, harmonization of legislation with EU.*

ESSENTIAL OILS AS A POTENTIAL BIOCONTROL OF IPS TYPOGRAPHUS, THE MAIN PEST OF NORWAY SPRUCE

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Abstract

The European spruce bark beetle is one of the most important insect pests of mature spruce stands (mainly *Picea abies* (L.) Karst.) throughout Eurasia. Together with storms, European spruce bark beetle is one of the most important natural disturbances. Its appearance in spruce forest changes environment drastically. Our experiment focused on insecticidal activity of essential oils (EO) as potential biological control agents against main pest of Norway spruce. European spruce bark beetles were collected directly from the fresh cut Norway spruces. Three plant species were selected for extraction of their essential oils (*Juniperus communis* L., *Origanum vulgare* L. and *Salvia officinalis* L.). Biological assays were conducted in controlled laboratory conditions. Different concentrations (1 %, 5% and 10 %) were applied on filter paper which was placed in Petri dishes together with beetles. The influences of the EOs were statistically significant. Juniper EO was the most effective, followed by oregano. EO of salvia was the less effective. Essential oils are natural products which show various biological activities. As natural based products, EOs are easy to prepare, less expensive and environmentally friendly.

Keywords: *European spruce bark beetle, Forestry, Insecticidal effect, Natural products.*

Acknowledgement

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DEVELOPMENT OF LINEAR EQUATIONS FORWHEAT RUST EPIDEMICSIN NEW HALFA AREA, SUDAN

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Abstract

A multiple regression computer program was used to develop equations predictive of the severity of leaf rust (*Puccinia recondita* f. sp. *tritici*), stem rust (*P. graminis f. sp. tritici*) of bread wheat (*Triticum aestivum)* and to estimate weekly cumulative urediniospore numbers of both rust species in New Halfa region, Sudan. Equations were generated for three overlapping periods to identify and quantify biological and meteorological variables which might provide clues of high predictive value for development of disease epidemics. Analysis of the combined data showed that the derived multiple regression models varied with prediction period, prediction duration, and rust species. On the whole, progress in time (X_1) invariably significantly contributed to variation observed in rust severity. Other significant variables were found to be components of atmospheric humidity: minimum RH (X_4), maximum RH (X_5), and numbers of hrs. RH > 80% (X_6), followed by maximum temperature (X_3) towards the end of the growing season, but with leaf rust only. Studies with mechanical rust spore trapping (MRST) indicated that wind direction (WD) had shown to have significant negative effect on stem rust spores, but no significant negative influence on leaf rust spores counts. However, the inclusion of wind speed (WS) as a fourth variable in the prediction model, significantly increased the amount of variation with leaf rust, and had no effect on stem rust species spore counts.

Keywords: *Wheat rust, epidemics, wind direction, wind speed.*

TRICHOGRAMMA REARING TECHNIQUE IN SUDAN AND EFFECT OF COLD STORAGE OF HOST EGGS ON PARASITISM AND OF PREIMAGINAL PARASITOIDS ON ADULTS EMERGENGCE

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Abstract

This study constitutes part of the *Trichogramma* Mass Rearing Project, being conducted at the Entomology Section, Crop Protection Research Centre, Agricultural Research Corporation, since January 2009. The objectives of the study were: (i) to provide detailed guides of Sudan technique on *Trichogramma* mass rearing; (ii) to report results of the effect of cold storage of host eggs (at 2±1ºC for 0 -10 days) prior to introduction to the parasitoid, on efficiency of parasitism and (iii) to report results on the effect of cold storage of preimaginal parasitoids, at 10±2ºC and complete darkness for 0 -10 weeks on adults emergence. The guides covered the rearing technique, the required conditions, equipments, and diet for the host *Corcyra cephalonica* (Stainton) (Lepidoptera: Pyralidae), and the parasitoid *Trichogramma principium* (Sugonyaev *et* Sorokina) (Hymenoptera: Trichogrammatidae). The percentage of parasitism ranged between 68.7% and 100% with an average of 88.8±7% on fresh eggs and between 28.6% and 69.7% with an average of 50.7±10.1% on cold stored eggs. This markedly indicated preference of the parasitoid females to lay eggs inside fresh, rather than cold stored eggs. The percentage of emerged adults out of the preimaginals, cold stored for 0 to 10 weeks was 91.6%, 67.3%, 68.5%, 65.2%, 64.4%, 49.2%, 42.4%, 38.4%, 28.6%, 23.3% and 17.8%, respectively. These results clearly explained the advantage of releasing non cooled preimaginal parasitoids directly in fields, rather than those subjected to cold storage. In case of production of the parasitoid during non-release season, cold storage should not exceed four weeks, after which a drastic decrease in emergence would occur.

Keywords: *Trichogramma rearing, cold storage, parasitism, adults' emergence.*

USING NON-LINEAR REGRESSION MODELS FOR PLANT PROTECTION STUDIES

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Abstract

The data set obtained in the plant protection studies such as population density of species and mite counts are based on count data. In the this type of data, a large number of zero values or very much differences between the minimum and maximum values in the population fluctuation studies are obtained. Poisson regression is frequently used for analyzing dependent variable based on count data. The main feature of the Poisson distribution is the assumption that the mean and variance are equal. However, this equal the mean and the variance relationship rarely occurs in application. In many case, the variance is larger than the mean, which is called overdispersion. In such a case, the application of Poisson regression causes biased parameter estimations and standard errors. When overdispersion occurs in a data set, negative binomial regression, in which parameter estimations are obtained by considering the effect that stems from overdispersion, is preferable. The observation obtained based on count data having Poisson distribution may have more zero values than expected. In this case, use of zero-inflated Poisson regression is a suitable approach to model the dependent variable having excessive zero values. Zero-inflated Poisson regression assumes that data set consists of two different types of data. First type is count data based on Poisson distribution which may have zero values, whereas second type is data having only zero values. Zero-inflated negative binomial regression and hurdle model are alternative models used for data set having excessive zero-values.

Keywords: *Count data, Overdispersion, Zero-inflated data, Poisson regression.*

AN APPLICATION POISSON LOG LINEAR REGRESSION FOR INFECTED PLANT DATA SET

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Abstract

In Poisson regression, dependent variable shows Poisson distribution. Poisson regression is frequently used for analyzing dependent variable based on count data. Poisson regression is based on generalized linear models. Without requiring any assumption on the original structure of a data set, Poisson regression is defined in the exponential form in the generalized linear models, and log link function is used for Poisson regression. However, in the Poisson regression, the dependent variable is a risk ratio or a relative risk can be estimated as count data. Dependent variable is very suitable for modelling the occurrence of rare events such as infected plants data set. Samplings were conducted from the coastal band of Van lake in 2014. It was constructed in two way contingency table between varieties (*Triticum aestivum* and *Secale cereale*) and location (Muradiye, Ahlat Erciş, Doğu Beyazıt and Iğdır). The reference parameters are: for varieties *Triticum aestivum*, and for location Muradiye. In the this study, the risk of infected plants for *Secale cereale* is 1.165 times higher when compared to *Triticum aestivum* and this difference was found statistically significant ($p<0.05$). The risk of infected plants for Ahlat is 0.799 times higher as compared to Muradiye ($p>0.05$), the risk of infected plants for Ahlat Doğu Beyazıt is 0.997 times higher when compared to Muradiye ($p>0.05$), the risk of infected plants for Erciş is 0.988 times higher when compared to Muradiye ($p>0.05$), and the risk of infected plants for Iğdır is 1.054 times higher when compared to Muradiye ($p>0.05$). As a result, there was no difference between locations according to infected plants.

Keywords: *Poisson regression, Log linear model, Infected plant, Relative risk.*

IDENTIFICATION OF FORK HEAD BOX PROTEIN IN OWERWINTERING SUNN PEST MIDGUT

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Abstract

Life cycle of some insects consists of diapause, which is mostly triggered by adverse environmental conditions including temperature, daylight change or food availability. Most insects genes and pathways are differently regulated during diapause. Forkhead box (FOX) proteins are a family of transcription factors that have been implicated in a variety of cellular processes. FOX is also a prominent member of the insulin signaling pathway which controls insulin in the fatbody and brain, as well as regulates life span and fertility in many insects. In the absence of food and insulin, FOX is activated and functions to suppress reproduction and lipid accumulation. Sunn pest, *Eurygaster maura*, is a major pest of cereal crops in Turkey and neighboring countries. This species is well-known with its obligatory adult diapause. Adults migrate from the overwintering locations to cereal fields in early spring where they feed, mate and lay eggs on cereal leaves. A new generation of adults keeps feeding on grains in order to store food for the overwintering period. Adults complete their life cycle by migrating to the highlands after harvest where they start hibernation period. In this study, a transcript encoding FOX was annotated in the cDNA library generated from the midgut of overwintering *E. maura*. The putative *E. maura* forkhead box (EmFOX) protein had a Forkhead domain and showed the highest identity (91%) with Fork head domain-containing protein FD2-like from *Halyomorpha halys*. We constructed a phylogenetic tree based on the FOX amino acid sequences from different insects showing EmFOX clustered together with Hemipteran FOX. Functional studies can provide useful information for understanding the role of FOX in insulin pathway, fat accumulation, and reproduction and also for determination of new potential targets for management of sunn pest.

Keywords: *Diapause, Forkhead box (FOX) protein, Midgut, Eurygaster maura.*

RECENT ADVANCES IN RNA INTERFERENCE RESEARCH IN ENTOMOLOGY

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Abstract

Insects are the largest group of the animal kingdom most of which are agriculturally and medically important. Chemical-based methods are still widely used to control pests, although resistance has been developed to various types of these insecticides. Widespread use of insecticides has harmful effects on human health, environment, non-targeted and beneficial organisms. RNA interference (RNAi), also known as "gene silencing", is a prominent pathway which is used as gene suppressor to control gene expression in various organisms. Expressed double-stranded RNAs (dsRNAs) target the essential genes to induce the gene silencing. In recent years, RNAi-based strategies have been increasingly used in order to suppress insect pest populations and to prevent pest damage to crops. This technique holds great potential for insect pest management in terms of understanding functional regulation of genes and identification of new insecticide targets. Efficiency of the method depends on some factors including concentration, nucleotide sequence and length of dsRNA fragment. There are different dsRNA delivery methods, such as oral delivery, microinjection, soaking, transfection, and nanoparticle-mediated. Also, transgenic plants expressing dsRNA of essential genes related to development, detoxification and digestion in insects are introduced as another delivery method. Here, we presented mechanisms of RNAi; successful RNAi based applications for the management of insect populations and discussed factors influencing this mechanism in insects.

Keywords: *Pest management, RNA interference, gene silencing, plant protection.*

EFFECT OF SOME DEMOGRAPHIC AND SOCIOECONOMIC FACTORS ON THE CONSCIOUSNESS OF CONSUMERS ABOUT FOOD SAFETY: THE CASE OF BURSA PROVINCE URBAN AREA IN TURKEY

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Abstract

Increasing population density in the cities presents various food safety threats during the foodsupply chain. Despite these increasing risks, consumers are becoming conscious about food safety through different sources of communication, but some non-scientific visual and written sources lead consumers to misapplication. Apart from this, some socioeconomic and demographic factors also affect consumers' attitudes and behaviours towards food risks. For all these reasons, this study was conducted to reveal the consciousness level of consumers about food safety in three districts of Bursa urban area,having the highest population density,during 2015-2016. For this purpose, a questionnaire consisting of 60 questions related with food safety was applied to 350 consumers with different age, gender, education and income levels. According to the results of the research, statistically important differences depending on the age, gender, education and income level of consumers were detected related with their knowledge about some basic food hygiene rules (like storing eggs without washing, not using the same kitchen materials during the preparation of meats and other foods consumed without cooking etc.), their shopping preferences (buying raw milk etc.) and their perspective about some food safety issues (organic foods, safety of chicken products etc.). The role of the respondents in the family has also been influential. The most striking result is that, the most important determinant of food purchasing is the level of income beyond the safety of food product.These results reveal that,as well as in the case of Bursa urban area,food consumers' attitudes towards food safety and their positive development in behaviour are highly dependent on their education and income factors.

Keywords: *Food safety, consumer behaviour, biodemographic, socioeconomic, Bursa.*

THE FARMERS LIVING ISSUES FOR PLANT PROTECTION PRACTICES IN AGRICULTURAL AREA OF MARDİN, TURKEY

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Abstract

This study was performed to determine the problems belonging to the application of plant protection practises in Mardin city of Turkey. For these purposes, a survey was conducted with 37 farmers in researchlocated of Mardin (Central, Derik, Kızıltepe, Mazıdağı and Nusaybin) in 2014. The data obtained from the study indicated that among all the management tactics, the chemical control was the only and dominant method applied in the Mardin. In this context, it was determined that albeit the majority of farmers advised by agrochemical dealers in the region, they were using unnecessary and excessive amounts of chemical pesticides. Additionally, the data obtained from this study showed that the local producers were in a state of an extreme dissatisfaction about the technical agencies who were most of the time very busy with the paper works in the provincial and district directorates, therefore they were not helpful enough to the producers.

Keywords: *Plant Protection Problems, Survey Study, Mardin*

PALYNOLOGICAL FEATURES AND TOTAL PHENOL-FLAVONOID CONTENT OF SOME HONEYS FROM EURO-SIBERIAN REGION (TURKEY)

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Abstract

Honey is natural sweet and varies in chemical properties depending on mainly its floral source. Pollen analysis and total phenol-flavonoid content were done according to the relevant literatures. In this study, the total phenol-flavonoid content and pollen composition of fifteen honey samples were investigated from the Euro-Siberian floral region in Turkey. According to melissopalynological (qualitative) analysis, eleven honey samples were unifloral (Castanea sativa (9); Rosaceae (1) and Onobrychis (1)), while four samples were multifloral. Forty-two pollen types from the samples were identified. The melissopalynological (quantitative) analysis based on Maurizio's Class demonstrated that one in Class II, three in Class III, one in Class IV and ten in Class V. Total phenol and total flavonoid contents in these honeys varied from 32.5-171.05 mg GAE/100g, 1.65-38.75 mg CAE/100g, respectively. According to this study the highest flavonoid levels obtained from Sample 9 (multifloral) and the highest phenol contents were shown in sample 1 (Castanea sativa). This study contributes to literature about Euro-Siberian honeys.

Keywords: *Euro-Siberian floral region, flavonoid, phenol, pollen, honey*.

IDENTIFICATION AND INFECTION PREVALENCE OF *SERRATIA MARCESCENS* IN NATURAL POPULATIONS OF SUNN PEST, *EURYGASTER INTEGRICEPS*

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Abstract

Bacteria of the genus *Serratia* are often associated with insects of many orders. *Serratia marcescens* is a facultative rod-shaped gram-negative bacterium which is a member of the Enterobacteriaceae family. *S. marcescens* has been reported as a pathogen of several economically important insect pests as well as beneficial arthropods. At present, several proteases have been described as being produced by different strains of *S. marcescens* including chitinases. The bacterium was capable of entering the hemocoel and produced significant mortality from fatal septicemia in populations of some insects. Also, synergistic effects occurred when a combination of *Bacillus thuringiensis* and endochitinase encoded by *S. marcescens* used in control of insects. On the other hand, S. marcescens is now recognized as an important opportunistic pathogen blocking the transmission of the pathogen by insects. In recent studies *S. marcescens* has been offered as an important candidate for paratransgenesis strategy which is a genetic modification of symbiotic microorganisms to deliver anti-pathogenic products and thus reduce vector competence. In this work, using 16 S bacterial library were reported the identification of a new S. marcescens strain in the field collected samples of sunn pest, *Eurygaster integriceps* which is a major constraint to wheat and barley. The phylogenetic trees based on the *16S rDNA* gene sequences arranged our strains within the S. marcescens cluster. 350 surface sterilized environmental samples were analyzed in terms of *S. marcescens* infection. We detected *S. marcescens* infections whereas infection frequencies varied among different populations. The role of *S. marcescens* infection involved in sunn pest is still unclear. It may be considered as a part of the normal gut flora of the sunn pest or also may be pathogenic to the sunn pest. The results obtained in this study showed that symbionts appear to be an important tool in developing alternative control strategies against sunn pest populations.

Keywords: *Sunn pest, endosymbiont, Serratia marcescens, 16S rDNA.*

DETERMINATION OF ANTIOXIDANT ACTIVITIES IN THE PRODUCTS OF DIFFERENT POMEGRANATE SPECIES IN HATAY REGION (TURKEY)

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Abstract

Edible part of Pomegranate (*Punica granatum*) consists of substantial amounts of acid, sugars, polysaccharides, vitamins and polyphenols. In literature, potential antioxidative properties of pomegranate juice have been reported. A dietary antioxidant ended reactive oxygen and nitrogen species or hinders formation of reactive oxidant. Flavonoids and other plant polyphenols are important antioxidants because of the high redox potentials. Antioxidant effects of phenolic compounds are explained with free radical scavenging, metal-chelating activities and inactivation of some enzymes. Research will be provided a contribution to the literature about the correct use of pomegranate by investigating antioxidant activity and phenol-flavonoid contents. For this reason, five different pomegranate juices and seeds obtained from pomegranate varieties and two pomegranate syrups were used. DPPH radical scavenging activities (SC_{50}) of the samples examined, the highest activity of the hicaz pomegranate seed (5.47 ± 0.20 mg/mL) and the minimum in the hicaz pomegranate (31.24 ± 0.18 mg/mL) was observed. The highest values H_2O_2 scavenging activity (SC_{50}), sweet pomegranate seed (7.32 ± 0.13 mg/mL), the lowest values sour pomegranate seed (93.24 ± 0.60 mg/mL) were determined. Metal-chelating activities, the highest activity in the sour pomegranate (%82.38 ± 0.52) and the lowest activity in sour pomegranate seed (%61.84 ± 0.24) was observed. Phenolic contents of pomegranate seed extracts were found between 338.61 ± 1.69 – 441.39 ± 0.74 µg GAE/mL. The amount of the phenol of pomegranate juice 21.58 ± 1.89-97.71 ± 0.42 338.61 ± 1.69 – 441.39 ± 0.74 µg GAE/mL is found to be in the range of. The amount of the total phenol of pomegranate has been identified as 117.83 ± 0.93-209.19 ± 0.02. Pomegranate seed extract, pomegranate juice and pomegranate the amounts of total flavonoids of samples have been determined as 115.75 ± 0.03 – 28.06 ± 0.07, 14.72 ± 0.19 – 19.13 ± 0.08 ve 29.24 ± 0.19 – 37.60 ± 0.64 µg CAE/mL, respectively.

Key words: *Pomegranate products, antioxidant activity, phenolic composition.*

BIOLOGICAL AND MOLECULAR CHRACTERIZATION OF UKRAINIAN ISOLATES OF ZUCCHINI YELLOW MOSAIC VIRUS

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Abstract

ZYMV can cause significant losses in yield during the early stages of plant development. In current project the possibility of seed transmission of Ukrainian ZYMV isolates was tested on *Cucurbita pepo* plants in insect-free greenhouse. The rate was assessed by ELISA and RT-PCR. Only one isolate ZYMV-14P showed seed-borne transmission with transmission rate 2,56%. This is the first detected seed-transmitted isolate in Ukraine. Further, nuclear inclusion-coat protein (NIb-CP) genome region of this isolate was sequenced as well as other 5 isolates detected in different locations. RT-PCR was accomplished using specific primers to NIb-CP genome region of ZYMV (expected product size – 600 bp). Then, obtained amplicons were purified and sequenced using Applied Biosystems 3730x1 DNA Analyzer with Big Dye terminators, version 3.1 (Applied Biosystems, USA). To investigate the genetic diversity among ZYMV-14P and previously characterized ZYMV isolates from Europe and other parts of the world, the phylogenetic analysis was carried out. It was conducted using Neighbor-Joining method in MEGA 6. Bean common mosaic virus was used as outgroup. Phylogenetic analysis defined ZYMV-14P isolate as member of group A. This isolate was clustered with isolates from Slovenia, Hungary, Czech Republic, Austria and France within subgroup AI. This group is the most frequent phylogenetic group, which is common for other European countries. Ukrainian isolates showed high identity level (99-100%) of NIb-CP genome region. Seed-transmitted isolate ZYMV-14P shared no statistically reliable differences in comparison with other five isolates detected in Ukraine.

Keywords: *ZYMV, seed transmission, phylogenetic analysis.*

HOW CAN THE STAFF HYGIENE PRACTICES INFLUENCE THE MILK HEALTHY QUALITY? CASE OF STUDY FROM M'ZAB DAIRY IN ALGERIA

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Abstract

The consumption of low-quality dairy products can endanger consumers' health and even cause serious food poisoning. The implementation of the quality policy in dairy units is therefore a priority in terms of consumer protection. To assess the implementation of hygiene in dairies in the Ghardaia region in Algeria, a field survey of 7 dairies and a literature research were conducted across the province. Members of staff play a vital role in determining food quality; being trained in hygiene practices remains a quality determinant. Conversely, if poorly trained or careless, staff can be a major source of contamination with their own health, their clothing or their work practices. Also, at the farm level, the incorrect maintenance of the milking equipment and the insufficient level of hygiene in the building proved to be a source of bacterial contamination. In this context, our work has focused on the evaluation of hygiene practices applied by dairies staff.

Keywords: *Aerobic plate count, Dairy, Hygienic Practice, Personal, Saharan Region, Safety*.

USING CLEAN AGRICULTURE FOR SAFE PRODUCTION OF DATE PALM FRUIT (PHOENIX DACTYLIFERA L. CV. "SEWI") IN THE CONDITIONS OF EGYPT

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Abstract

The excessive use of chemical nitrogen fertilizers not only has accelerated soil acidification, but it has also contaminated groundwater and the atmosphere and increased the concentrations of heavy metals in plant and fruit tissues, posing a serious threat to human health. This work was carried out during 2015 and 2016 seasons on date palm trees cv. 'Sewi', grown in Egypt. The aim was to study the effect of mineral, organic and bio-fertilizers and their combinations on fruit yield and quality parameters, and to encourage growers to use organic and bio-fertilizers rather than mineral fertilizers. Six treatments of fertilization were applied as follows; 100% mineral (NPK), 100% organic (manure), 100% bio-fertilizer (*Azotobacter chroococcum* (Az14), *Bacillus megatherium* var. phosphaticum (B6) and *Bacillus circulans* (B4)), 50% organic + 100% bio-fertilizer, 50% mineral + 100% bio-fertilizer, and control (no fertilizer added). The results showed that the treatments 50% organic + 100% bio-fertilizer and 50% mineral + 100% bio-fertilizer improved the fruit yield and quality of the 'Sewi' dates. The treatment 50% organic+ 100% bio-fertilizer resulted in the highest leaflet area, fruit yield, fruit and flesh weight, soluble solids content, vitamin C, and total sugars, but in the lowest fruit firmness. While, 50% mineral + 100% bio-fertilizer resulted in the highest number of new leaves, the highest leaf length, fruit length, fruit diameter and reducing sugars. The results indicated that the natural fertilizers improved the fruit yield and quality of dates, compared to mineral fertilizers; consequently making such dates more favorable to consumers.

Key words: *Clean agriculture, date palm, bio-fertilizer, fruit quality*

VIROLOGICAL EXAMINATION OF PUBLIC ORNAMENTAL PLANTS

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Abstract

Ornamental plants are gaining an increasing role because of the increasing urbanization.In Hungary, about 30-32 million annuals are cultivated annually. The annual ornamental plants dominate in the public spaces of Hungary, where 30 - 40 of the species are generally cultivated. The widespread species of the annuals are the Cockscomb species (*Celosia spp*.), Petunia species (*Petunia* spp.), Begonia (*Begonia spp*.), Sweet potato (*Ipomoea batata*) and Impatiens (*Impatiens spp*). The purpose of our research was to determine the natural viral infection of planted plant material and the epidemiological significance of these viruses.Our study was carried out from samples collected from the flower beds in the spring, summer and autumn (depending on the time of planting) of 2016, from Keszthely, Zalaegerszeg, Óhid, Türje, Tekenye, Sümeg and Zalaszentgrót settlements in Zala county. One of the most common methods for diagnosing plant viruses was used - the double antibody sandwich (DAS ELISA). In case of 56 samples, viral infections were detected from ten samples. Tomato spotted wilt virus (TSWV) was present in five samples (two *Celosia*, one *Impatiens*, one *Begonia*, one *Tagetes*) after serological testing. In five-five cases, Tomato mosaic virus (ToMV) was diagnosed in one *Tagetes*, two *Callistephus*, two *Dianthus*, as well potato virus A (PVA) in two *Begonia*, two *Celosia* and one *Impatiens*. Potato Y virus (PVY) was found in three cases (one *Celosia*, one *Begonia*, one *Tagetes*) and in one case Cucumber mosaic virus (CMV)(one *Impatiens*). The registered viruses from these species have never been detected before not just in Hungary, but worldwide, according to the „Viruses on Plant Virus Descriptors and Lists" from the VIDE Database web site.

Keywords: *annual, ornamental plants, virus infection, serological methods*

STUDIES ON JOINT TOXIC EFFECTS OF A GLYPHOSATE HERBICIDE (FOZÁT 480) AND A HEAVY METAL (CADMIUM) ON CHICKEN EMBRYOS

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Abstract

The aim of the study was to determine the individual and combined toxic effects of the herbicide Fozát 480 (glyphosate [isopropylamine salt] 480g/l) and cadmium sulphate ($CdSO_4$) on the development of chicken embryos. On the first day of incubation, chicken eggs were injected with 0.1 ml of cadmium sulphate solution (0.1%) and/or with 0.1 ml of Fozát 480 (2.0%). The chicken embryos were examined on the 19th day by measuring the rate of embryo mortality and body weight and by identification of different types of developmental anomalies and macroscopic malformations. The body weight data were statistically evaluated by one-way ANOVA and Dunnett tests, while the embryonic mortality and the developmental anomalies were analysed by Fisher test. Our teratogenicity study revealed, that the combined administration of cadmium sulphate and glyphosate (isopropylamine salt) containing herbicide formulation caused a significant reduction in the body weight of embryos and increased the rate of embryonic mortality. The joint toxic effect of cadmium sulphate and Fozát 480 is an additive effect compared to the individual toxicity of the test materials.

Keywords: *glyphosate (isopropylamine salt), cadmium sulphate, joint toxic effect, ecotoxicology, chicken embryo*

WHAT ORCHARDISTS EXPECT FROM FARMER FIELD SCHOOLS ON INTEGRATED PEST MANAGEMENT: A CASE OF IRAN

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Abstract

Since 2002, the implementation of integrated pest management (IPM) program through farmers' field schools (FFS) approach has gained some priority on the agenda of Iran's extension services. Different nature of agricultural activities and the specific context of farming in each area of the country have raised some questions regarding the suitability of these training programs to meet the needs of participants. In line with this, a need assessment survey in the summer of 2015was conducted to extract the educational needs of orchardists living in west part of Iran. The study population consisted of all the grape and pomegranate growers that participated in the IPM/FFS programs (N= 420). A sample of 201 individuals was selected through a simple random sampling manner. To collect data, a questionnaire based on Borich model was administered. Results indicated that the most important need was "to be skillful in tree pruning" and the least important was "to train participants based on lecturing and formal classes", scoring 4.30 and 3.24 out of 5, respectively. Moreover, "the ability to recognize the best time to spray pest-herbicides", "practical identifying of the symptoms of plant diseases and direct observations", "pre-assessment of participants' information before launching the programs" and "acquisition of the know-how knowledge to use bio-fertilizers and manures" were the first four priorities of respondents' needs among a total of 49. The study concluded with the idea that most of orchardists were aware of the need to conserve the environment and produce safe crops but IPM/FFS training programs could not provide them with adequate skills to perform the sound method and practice in their professional activities.

Key words: *IPM/FFS programs, Orchardists, Borich need assessment model, Iran*.

EVALUATION OF DOSES OF RADIATION DUE TO NATURAL RADIOACTIVITY IN CORN AS ANIMAL FEED IN THE VICINITY OF THE CITY OF SKOPJE (MACEDONIA)

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Abstract

Soil is the first link of the ecological chain soil-food-animals-human, and for this reason it has an important role in the distribution and transfer of radionuclides in fodder. The natural radionuclides come from the soil to the crops by means of migration and contribute for the total radiation burden in the population. The goal of this study was focused on investigation of the radioactivity in corn, and presence of natural radionuclides, and on the basis of the specific activity of the crops, we will calculate the dose which the human receives if the person consumes the examined crops. The corn samples were collected in 2016 from different locations in the surrounding of the city of Skopje. The sampling was performed so that 3 samples were taken from every location, which is in accordance with the recommendations from IAEA. The samples are measured on an instrument – gamma spectrometer (Canberra Packard) by using the program GENIE 2000. The values of specific activity and the calculated doses obtained in this study, regardless of the location, did not exceed the safety limits, pointing out the insignificant danger for radiation which arises from soil radionuclides which are naturally present. From the indicated above it follows that at a current level of radioactive contamination of corn, it would not be necessary to take measures in regard to reduction of the radioactive contamination, considering that the values of the radioactive contamination, compared to the level of radiological contamination of natural origin, are lower.

Key words: *radioactivity in corn; radionuclides; gamma spectrometry.*

THE INFLUENCE OF THE DRYING TECHNOLOGY ON THE CHEMICAL COMPOSITION OF *STENLEJ* AND *CACANSKA RODNA* PLUM CULTIVARS

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Abstract

In fruit growing production in the Republic of Macedonia, plum growing is of great importance. Knowledge of the chemical composition of plums has significant importance for human nutrition as well as for technological processing. The aim of this research was to determine the difference in the chemical composition of fresh and dried plum fruits from the cultivars *stenlej* and *cacanska rodna*. The examinations were done in 2014. The chemical properties of fresh and dried plum fruits were determined. Drying of plums was done in a ventricular dryer with heated air. All of the tested parameters had higher values in the dried plums of both cultivars than in the fresh ones. The content of the total dry matter was higher in the dried plums of the *stenlej* cultivar (79.90%) and the *cacanska rodna* cultivar (84.00%) than in the fresh plums of the *stenlej* cultivar (17.10%) and *cacanska rodna* (19.80%). Total acid content was higher in the dried plums of the *stenlej* cultivar (0.40%) and *cacanska rodna* (0.30%). In the fresh plums this value was 0.85% for the *stenlej* cultivar and 0.97% for the *cacanska rodna* cultivar. The content of vitamin C in the dried plum fruits of the *stenlej* cultivar was 7.00 mg% and 6.80 mg% in the *cacanska rodna* cultivar. In the fresh plums this value was 5.60 mg% for *stenlej* and 4.80 mg% for *cacanska rodna*. The content of mineral matter in the dried plums of the *stenlej* cultivar was 2.50% and the dried plums of the *cacanska rodna* cultivar was 30.30%. In the fresh fruits, the content of mineral matter is 0.52% for the *stenlej* cultivar and 0.40% for *cacanska rodna*.

Key words: *Plums, Ventricular drying, Chemical composition.*

CORRELATION BETWEEN INDIGENOUS AND COMMERCIAL STRAINS OF YEAST IN THE PRODUCTION OF WINE FROM THE GRAPE VARIETY VRANEC

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Abstract

This scientific research determined the impact of indigenous and commercial yeast strain on the production of wine from the grape variety Vranec, grown on Crveni bregovi locality, near Negotino, at an altitude of 250 m. The main objective was to display the correlation between indigenous yeast strains F-8 and F-78 with the commercial strain D-80 (Lallemand). The domestic yeast F-8 and F-78 were previously isolated at the Tikves wine region, Republic of Macedonia. The main purpose of this research is to make a comparison between the wine produced from indigenous yeast strains F-8 and F-78 with the commercial strain D-80. The chemical analysis of the wine, monomeric anthocyanins, polyphenolic composition, and the color intensity of the wine produced from the domestic yeast strains, were compared with the wine produced from the commercial yeast strain. The basic parameters, such as alcohol, sugar, total acids, volatile acids, pH, free/total SO_2, were determined applying international methods of analysis of wines and musts (OIV methods). The correlation value between the main parameters was obtained by using the statistical analysis of the results obtained by applying the software package SPSS 19. The analysis shows that there is a correlation between the analyzed parameters of the wine from the grapevine Vranec, among different strains of yeasts. The Pearson's coefficient of correlation (ρ), between wine Vranec from F-8 and D-80 is (,996) which means high correlation value. Also, the Pearson's coefficient of correlation (ρ), between wine Vranec from F-78 and D-80 is (,999) which means realy high correlation value.

Keywords: *indigenous yeasts, wine, Vranec, anthocyanins.*

PHYSICAL AND CHEMICAL QUALITY PARAMETERS OF HONEY FROM CENTRAL SERBIA

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Abstract

In this paper, analyzes were conducted on the false acacia, meadow, and mixed honey and honeydew from the territory of Central Serbia. Honey was obtained from the area which is bordered to the east by Mojsinjske mountains and Jastrebac, from the south and west by the mountains of Kopaonik and Goč, and from the north by Resavske mountains. Quality parameters of honey (ash, water, acid, and total reducing sugars, sucrose and diastase activity) were determined by the methods from the Rulebook of honey quality (Sl. SCG, 2003). Total nitrogen was determined by micro-Kjeldahl method, phosphorus was determined by spectrophotometry, and potassium by AAS method. Most of the analyzed honeys met both domestic (which are somewhat sharper for individual parameters) and EU standards. Deviation was present in two samples of the mixed honey, where total acidity exceeded both standards and in two samples of honeydew, where results for this parameter exceeded the domestic standard. It was found that the type of honey significantly ($p < 0.05$) influences the amount of ash, total acidity, diastase number and amount of reducing sugars. False acacia honey had high P content (73.3 $mgkg^{-1}$) and honeydew had the highest N (937.8 $mgkg^{-1}$) and K (84.1 $mgkg^{-1}$). The amount of N, K and Mg significantly ($p < 0.01$) depended on the type of honey and the differences in the amount of phosphorus did not show statistical significance. False acacia honey had the most of Na and Fe, meadow honey had the highest content of Zn and honeydew had the most of Mn.

Keywords: *honey, Central Serbia, physical and chemical parameters, macro - and micro-elements.*

OVERVIEW OF LEAF MINER FAUNA IN SERBIA

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Abstract

Due to their specific lifestyle, frequency of occurrence, and the damage that they cause on plants, leaf miners have been investigated by many scientists in Serbia. Unfortunately, the overview of research on their fauna in Serbia has not been done yet. Therefore, based on the data from the literature sources and the results of our research, the first overview of leaf miner fauna research in Serbia was made. It was found that 363 species of leaf miners were ascertained in Serbia so far. They are classified as follows: 270 species from 26 families of the order Lepidoptera, 61 species from 5 families of the order Diptera, 21 species from 3 families of the order Coleoptera, and 11 species from 1 family of the order Hymenoptera. The majority of species of the order Lepidoptera belongs to the families Gracillariidae (71), Nepticulidae (61) and Coleophoridae (37), of the order Diptera to the family Agromyzidae (53), and from the order Coleoptera to the families Curculionidae (12) and Chrysomelidae (7). All species of the order Hymenoptera (11) belong to the family Tenthredinidae. Monophagous and Oligophagous species are dominant among the identified species of leaf miners in Serbia. The majority of the species (57%) develop on woody plants. Most of them (30) on the species of the genus *Quercus*, *Prunus* (20), *Malus* (19), and *Populus* (19). The list of 363 species of leaf miners that were identified in Serbia is not definitive. How European leaf mining insect fauna includes about 2500 species, it is certain that new species will be found in the future.

Keywords: *phyllophagous insect, Serbian species list.*

FIELD RESPONSE OF BUPRESTID BEETLE, ANTHAXIA (ANTHAXIA) ANATOLICA ANATOLICA CHEVROLAT, TO SYNTHETIC SEMIOCHEMICALS

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Abstract

Many buprestid species use visual cues to locate hosts and potential mates. Standard yellow sticky cards tend to capture less buprestid individuals than blue traps. Since some semiochemicals are attractive to buprestid adults, they can be used for trapping them. The hypothesis of this study was to test if trapping capacity of buprestid adults on yellow traps can be increased by semiochemicals. In Bursa region of northwestern Turkey, we investigated the variation in adult captures of a common buprestid beetle, *Anthaxia anatolica anatolica*, on yellow sticky traps baited with synthetic semiochemicals, methyl salicylate (MeSA), benzaldehyde (Be), linalool (L) and farnesene (F) alone and their binary combinations (MeSA + Be; MeSA + F; MeSA + L; F + Be; Be + L; F + L). The study was conducted at three plots in an apple orchard in Bursa, Turkey in 2013. Buprestids were monitored weekly at each plot. In field studies, 52% of jewel beetles were attracted to the synthetic semiochemical formulations. The highest number of adults was caught in traps with Be (2.4 adults/trap), followed by those with F (1 adult/trap) and MeSA + F (0.7 adults/trap) combination. The lowest number of buprestid adults was observed in MeSA + L (0.2 adult per trap), followed by the Be + L (0.3 adults per trap) combinations. Overall, yellow sticky traps impregnated with Be were significantly more attractive to *A. anatolica anatolica* adults compared with other traps. The effects of benzaldehyde on other harmful buprestid species should be investigated in future studies.

Keywords: *Attractant, benzaldehyde, buprestid, semiochemicals, sticky trap*

POSTHARVEST QUALITY OF NON-ASTRINGENT 'FUYU' PERSIMMON FRUITS AS AFFECTED BY DIFFERENT DOSES OF 1-METHYLCYCLOPROPENE (1-MCP)

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Abstract

Non-astringent 'Fuyu' persimmon fruits were harvested at optimal harvest maturity and randomly divided into four groups. Thethree groups of fruitswere treated with 156.25, 312.5 and 625 ppb 1-MCP, respectively at 5°C for 24 h. The fourth group of fruits considered as control fruit. The treated and non-treated (control) fruits were stored at 0±1°C and 90±5% relative humidity for 3 months. After the cold storage,fruits were also kept at 20°C for additional 3 days to simulatetheir shelf-life period. Fruits were removed from different storage conditions at 30 days intervals and weight loss, fruit firmness, skin colour, soluble solids, titratable acidity and decay development during storagewere studied. Furthermore, respiration rate and ethylene production of persimmon fruits were also recorded.The lowest weight loss, decay development, respiration rate, ethylene production andthemaximum titratable acidity, fruit firmness, L^*, $h°$and C^* valueswere recorded in the fruits treated with 625 ppb 1-MCP. The fruits treated with the highest 1-MCP dose (625 ppb) showed better performance as compared with other 1-MCP treatments in terms of keeping the best postharvest quality of persimmonfruits during cold storage and shelf life conditions. On the basis of our results it is recommended to use 625 ppb 1-MCP for obtaining better postharvest quality in non-astringent 'Fuyu' persimmon fruits during long term storage.

Keywords: *Persimmon, storage, quality, shelf life, ethylene, respiration*

IMPACT OF DIFFERENT DOSES OF 1-METHYLCYCLOPROPENE (1-MCP) ON POSTHARVEST QUALITY OF ASTRINGENT 'HACHIYA' PERSIMMONS

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Abstract

Astringent 'Hachiya' persimmon fruits were harvested at optimal harvest maturity and divided into four groups for treatment with different 1-MCP doses. The following doses of 1-MCP 0 ppb (control), 156.25 ppb, 312.5 ppb and 625 ppb were tested for postharvest quality of 'Hachiya' persimmons. 1-MCP treatments were carried out at 5°C for 24 h. Treated and untreated (control) fruits were stored at 0±1°C and 90±5% relative humidity for 3 months. Fruits were held at 20°C for 3 days after the cold storage with the aim of determining the shelf-life performance. Fruits were removed from storage conditions at 30 days of intervals and weight loss, fruit firmness, skin colour, soluble solids content, titratable acidity, decay development during storage and shelf-life conditions were noted. Furthermore, respiration rate and ethylene production of persimmon fruits were also recorded.The fruits treated with the highest 1-MCP dose (625 ppb) gave better results regarding the lowest weight loss and decay development. The use of 625 ppb 1-MCP also resulted the highest soluble solids, fruit firmness, L^*, $h°$ and C^* values, respectively, as compared to the other treatments during the cold storage and shelf-life. Minimum respiration rate and ethylene production were recorded in the fruits treated with 1-MCP dose of 625 ppb. Thus, it can be concluded that 625 ppb 1-MCP can be used for the effective treatment of astringent 'Hachiya' persimmons during 3 months cold storage.

Keywords: *Persimmon, postharvest, ethylene, respiration, 1-MCP*

A REVIEW OF INTER-ROW CULTIVATION TECHNIQUES

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Abstract

In crop production, weeds should be controlled to obtain the highest potential yield and the best crop quality because they compete directly with the crop in utilizing nutrients, light, and water. The use of herbicides was rapidly accepted by many farmers and became an accepted part of plant management process because weeding has traditionally been a labor intensive operation in crop production. However, environmental consequences of chemicals use have been rapidly becoming important global issues because an over-reliance on herbicide use led to the widespread development of herbicide resistant weeds and concerns about potential negative effects on human health and the environment. Therefore, there is increasing interest in non-chemical methods of weed control in recent years and a range of techniques and machines have been developed for non-chemical weed control. Mechanical cultivation is a method for non-chemical weed control in row crop productions. Mechanical cultivation may also improve soil aeration and irrigation efficiency by breaking surface soil crystals. Machinery design and working parameters are very important factors for efficient row crop. This paper outlines the design and working parameters of tools used in inter-row cultivation and discusses the factors to be considered for more effective and sustainable weed management.

Keywords: *Weeding, inter-row cultivation, mechanical weed management*

THE PHYLOGENETIC ANALYSIS OF THE PLUM POX VIRUS IN DIFFERENT REGIONS OF UKRAINE

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Abstract

The plum pox virus (PPV) is a pathogen that causes a dangerous disease of stone fruit crops, widespread throughout the world. It attracts much attention of researchers as a quarantine object and causes significant economic losses. PPV is widespread in almost all regions of Ukraine and poses a serious threat to horticulture of our country. The aim of this research was to conduct a phylogenetic analysis of PPV in Ukraine. The samples were visually selected from the central and northern regions of Ukraine. Nowadays, a promising and accurate method for detecting viral infections is a polymerase chain reaction (PCR). In the studied regions, PCR detected strains and found that the most common was the D strain (apricot, peach, plum), and the least common was the M strain (apricot, peach), while in some cases the researchers observed a mixed infection. Moreover, gene sequencing was done. The phylogenetic analysis confirmed the identity of the strains and helped us made a comparative characterization of the samples to the already known strains. Depending on the strain, different kinds and varieties of plants can be damaged and crop losses can significantly vary. Therefore, it is important to determine the diversity of PPV strains and their similarities with other isolates. Setting the phylogenetic relationship between Ukrainian isolates allows us to predict the development of spreading of the virus to different regions of Ukraine and neighboring countries, to establish its origin and to predict the development of possible epidemics caused by more aggressive strains.

Keywords: *Plum pox virus, phylogenetic analysis, sequencing, strain diversity.*

DIVERSITY OF PLUM POX VIRUS STRAINS IN ODESSA REGION (UKRAINE)

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Abstract

The plum pox virus is the causal agent of sharka disease, one of the most harmful viral diseases of stone fruit cultures. PPV is genetically diverse. The strain PPV-D has been found in every country where PPV has been detected. The strain PPV-M is distributed mainly in Southern and Central Europe. This strain is described as more aggressive than strain D and efficiently transmitted by vectors. The disease causes heavy losses in susceptible varieties of stone fruit crops. The cultivation of stone fruit crops in Odessa region caused by it's climate condition. Therefore, determining the strain diversity of the plum pox virus is important. In 2015-2016, we selected 265 samples of stone fruit cultures. To identify the virus the infected plants were subjected to visual diagnostics. All samples were analyzed with ELISA and positive samples were tested with molecular methods. It was found that among the stone fruit crops, most virus-positive was the peach - 45,6%, and plum - 42,1% of the total number of positive samples, sweet cherry - 8,3%, cherry plum 2.8% and nectarine - 1,2%. Our research showed that in Odessa region, the strain PPV - D is the most common on peach and plum – 87,7%. More than 8% found in Odessa region of the isolates belong to the strain M. Thus, in Odessa region there are two strains of the plum pox virus – PPV-M and PPV–D. Therefore, timely diagnosis is a reliable method of preventing the development of viral infections. Of particular importance is the prediction of the spread of pests and vectors control.

Keywords: *plum pox potyvirus, sharka disease, strain diversity.*

PREVALENCE OF PANTOEA AGGLOMERANS AMONG SUNN PEST POPULATIONS

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Abstract

Microorganisms colonize the insect gut through food and play a significant role in digestion and metabolism. Studies that used either antibiotic treatment or egg surface sterilization suppressed or eliminated gut symbionts; resulting in substantial fitness defects, including retarded growth, elevated mortality, morphological abnormalities, reduced offspring, and/or complete sterility, indicating the biological importance of this symbiosis. In addition, gut-symbiotic bacteria have been reported to protect hosts against pathogens, parasites, and xenobiotics. In most stinkbug species examined so far, the gut symbiotic bacteria were typically found dominated by Enterobacteriaceae species. Among allied free-living bacteria of the Enterobacteriaceae *Pantoea* genus is one of the common midgut symbionts associated with Pentatomids. In this study we have isolated different *Pantoea* strains from sunn pest, Eurygaster integriceps which is a Hemipteran bug belongs to the Scutelleridae family. *E. integriceps* is one of the most serious pests of wheat and barley that feeds on different stages of developing grains. They suck the milky nutrients from the immature grain by piercing it with their mouthparts and injecting their saliva into the grain that degrade gluten proteins. Direct plating of the surface sterilized individuals was used for the isolation of the sunn pest microbiota. After DNA isolation PCR reactions were performed using universal primers for bacterial 16S rRNA. The purified PCR products were cloned into the Promega pGEM-T Vector and all the inserts were sequenced. Sequences obtained were searched in the NCBI database using BLASTN analysis and aligned using CLC Workbench to consensus sequences. Analysis with the 16S rRNA gene sequence identified the eleven bacterial isolates as *Pantoea agglomerans*. Infection rates of the Pantoea symbiont in local populations of E. integriceps were surveyed by diagnostic PCR with a specific *P. agglomerans* primer set, which revealed that the symbiont was prevalent with varying infection rates in different local populations collected from Turkey. Future genomic and physiological studies on the sunn pest-Pantoea symbiotic system would elucidate their genetic diversity and co-evolutionary history with stinkbugs and the effects of *Pantoea* elimination to reveal symbiosis effects on their hosts.

Keywords: *Sunn pest, endosymbiont, Pantoea agglomerans, 16S rDNA*

THE MAIN CITRUS APHID SPECIES AND THEIR PARASITOIDS IN NORTHWESTERN ALGERIA. WHY IS APHID CONTROL NOT ALWAYS SUCCESSFUL?

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Abstract

Aphids are an important problem in the Algerian citrus groves with very high aphid densities during spring seasons. During the last years, the aphid *Aphis spiraecola* Patch has displaced *Aphis gossypii* Glover and *Toxoptera auranthii* Boyer de Fonscolombe (Hemiptera: Aphididae) in most citrus groves located in the region of Mostaganem (Northwestern Algeria). Research conducted in order to develop the control of the main *Citrus* aphid species can be regarded under two main lines. Firstly, we have to evaluate parasitoid populations able to destroy the aphid populations and secondly, we need to develop an efficient method by the creation of refuges for the parasitoids and also for a large number of natural enemies. This study was carried out in 2 localities in order to determine the main parasitoids associated with the dominant aphid species and to evaluate the impact of pesticides on the parasitism rate. Samples of infested young leaves were recorded weekly from the beginning of the flush period until the end of spring. Aphids species and their parasitoids were determined during two seasons. Aphid densities reached 153 aphids/leaf equivalent to 10 aphids/cm². The parasitoid species *Lysiphlebus testaceipes* Cresson and *Binodoxys angelicae* Haliday (Hymenoptera: Braconidae: Aphiinae) are associated with both *A. spiraecola, A. gossypii* and *T. aurantii*, but the parasitism rate remains very low in both situations varying between 0,76 and 2,66. We tried to give some factors to explain why parasitoids were unsuitable for use in biological control of *A. spiraecola.*

Keywords: *Citrus, aphids, natural enemies, integrated control, Northwestern Algeria*.

SIDE EFFECTS OF THREE NEONICOTINOID INSECTICIDES USED AS FABA BEAN SEED TREATMENTS FOR CONTROLLING COWPEA APHIDS

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Abstract

Field and laboratory experiments were conducted using faba bean seeds treated with neonicotinoid insecticides (acetamiprid, imidacloprid, and thiamethoxam) to evaluate the protective ability of these treatments from aphid damage. In addition, we investigated the neonicotinoid effects on the yeast, *Saccharomyces cerevisiae* and mycorrhizal fungus populations relevant to the growth plants. The treatments showed a high efficiency in protecting faba bean plants from cowpea aphid infestation for 48 days after planting. On the other hand, negative effects were observed toward soil yeast, *Saccharomyce*s *cerevisiae* and mycorrhizal fungus, *Glomus mosseae* populations and reduction in nodulations as well as shoot and the root weights till 30-days from sowing. However, the side effects of these neonicotinoids varied, and the low severe effects were observed with thiamethoxam treatment. These neonicotinoids treatments affected faba bean seed yield, which significantly increased compared to the untreated control.

Keywords*:* *neonicotinoidsfaba bean seed treatment, cowpea aphid, soil microorganisms, nodulation.*

NUTRITIVE VALUE OF FARM FISH

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Abstract

Eighty samples of farmed fresh water fish (*Tilapia nilotica*and *Clariasgariepinus*) were collected (40 of each) andanalyzed chemically for moisture, protein, fat, ash, carbohydrates, energy and cholesterol. It is evident that the mean values of moisture % in *T. nilotica*and *C. garpienus*were 78.74 ± 0.18 and 77.07 ± 0.32, respectively. The mean values of protein % in *T. nilotica*and *C. garpienus*were 83.75 ± 0.44 and 74.12 ± 0.81, respectively. The mean values of fat % in *T. nilotica*and *C.garpienus*were 7.57 ± 0.26 and 16.20 ± 0.70, respectively. The mean values of ash % in *T. nilotica*and *C. garpienus*were 7.27 ± 0.22 and 8.09 ± 0.25, respectively. We have found that the mean values of carbohydrates % in *T. nilotica*and *C. garpienus*were 1.42 ± 0.14 and 1.62 ± 0.15, respectively. The mean values of energy value (kcal / 100g) in *T. nilotica*and *C. garpienus*were 408.66 ± 1.43 and 448.48 ± 3.44, respectively. The mean values of cholesterol (mg/100gm) in *T. nilotica*and *C. garpienus*were 36.51 ± 0.99 and 50.95 ± 1.33, respectively. The variation of chemical contents between the two species has been discussed.

Keywords: *Nutritive Value, Farm Fish, energy value, Egypt.*

TRANS FATTY ACIDS OF FAST FOOD IN ASSIUT, UPPER EGYPT

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Abstract

Sixty different fast foods samples (fried chicken, chicken shawerma, fried hotdog, beef shawerma, fried beef burger and fried beef sausage) were collected from fast food restaurants in Assiut city, Upper Egypt. The obtained results indicated that total trans-fat content were detected with percentages of 100, 94.45.100, 100, 75 and 82.35 in the examined samples, respectively. The mean values ranged from 0.26±0.07 to 5.29±0.24with no significant difference ($p<0.05$),while elaidic acid contentwas detected with percentages of 83.33, 83.33, 72.22, 53.85, 62.50 and 64.71, respectively. The mean values ranged from 0.08±0.06 to 2.29±0.04with no significant difference ($p<0.05$). Moreover,linoelaidic acid content was detected with percentages of 88.33, 22.22, 61.11, 84.62, 0 and 0, respectively. The results showedthat beef shawerma and fried beef burger contained TFA, Eliadic acid and Linoeliadic acid (84.62 %) with a significant difference ($p<0.05$).According toestablished level (0.5g per serving)recorded by FDA, 2003, the obtained data were detected 70%,55%,80%,70%,70% and 30% in the examined samples, respectively.Transfatty acid in the examined samples was present due to either overheating of oil for several times,or using of hydrogenated oils. In conclusion, avoiding public health hazard of fast food depends upon authorities, food retailers and consumers**.**

Keywords: *Transfatty acids, fast food, public health hazard, Egypt.*

DETECTION OF *COXIELLA BURNETII* IN RAW MILK USING PCR

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Abstract

Coxiella burnetii is a strict fastidious obligate intracellular Gram-negative bacterium, a causative agent of an important zoonotic disease named coxillosis or query fever (Q-fever). In this study, a total of 150 random raw milk samples from dairy cattle, ewes and goats (50 samples each) were collected from different farms in Assiut governorate in Egypt. All the collected samples were examined for the incidence of *Coxiella burnetii* using PCR. The obtained results revealed that 9 cattle milk samples (18%), 4 ewes milk samples (8%) and 3 goat milk samples (6%) were positive. In total, 16 milk samples out of the 150 milk samples (10.67%) were contaminated with *Coxiella burnetii*. The obtained results are reflecting the public health hazard of consumption of such raw milk.

Key words: *Coxiella burnetii, raw milk, Assiut governorate.*

DEPOSITION OF COPPER IN CATTLE AND BUFFALOES TISSUES SLAUGHTERED IN ASSIUT PROVINCE, EGYPT

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Abstract

Chronic copper poisoning may occur in animals under natural grazing conditions, as a consequence of excessive consumption of copper-containing salt licks or mixtures, from the unwise use of copper-containing drenches, from contamination of feeds with copper compounds and from agricultural or industrial sources. Abnormally high copper levels are characteristic of a number of diseases in man, such as Mediterranean anemia and cirrhosis. A total of 168 samples of livers, kidneys and muscles (part of the diaphragm) were screened. The samples were subjected to preparation & for measurement the level of copper by using Atomic Absorption/Flaming Emission Spectrophotometer. Buffaloes organs showed variations in their copper content. As for liver, the mean copper concentrations was 11.52 ± 5.41 with a range varied from 2.34 to 21.88 μg/g wet weight. Whereas in buffalo kidneys copper level varied from 2.34 to 15.13 with a mean value of 5.85 ± 4.34 μg/g wet weight. Moreover the concentrations of copper in buffalo muscles varied from1.56 to 15.50 μg/g wet weight with a mean value of 4.35 ± 3.96. On the other hand, copper in cattle liver varied in its concentrations where the mean value was 11.59 ± 5.79, with a range varied from 3.13 to 25.00 μg/g wet weight. Copper in cattle kidneys varied from 2.50 to 16.3 with a mean value of 4.18 ± 3.12 μg/g wet weight. Moreover, the concentrations of copper in cattle muscles were 3.23 ± 2.48, 1.88 and 14.34 μg/g wet weight, respectively as a mean, minimum and maximum.

Keywords: *Copper toxicity in cattle***,** *Copper toxicity in buffaloes***,** *Egypt.*

VIRULENCE OF THE WHEAT LEAF RUST POPULATION IN GEORGIA

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Abstract

In Georgia, one of the centers of origin of wheat, rust pathogens are common. Rust surveys through out different geographical zones of Georgia indicated that wheat leaf rust caused by *Puccinia triticina f. sptritici* occurred with low incidence (1-20%) in 2014-2015 wheat growing season. Disease severity varied from 5% to 100% depending on the environment and wheat varieties. Wheat leaf rust was first observed in the fall-planted wheat plots in Colchis Lowland around mid-May.In June-July, it spread across the other zonescharacterized by more temperate dry climate. The virulence of 114 single isolates was characterized on the set of 20 North American leaf rust differential near-isogenic lines. In addition, five supplemental tester lines carrying Lr23, Lr25, Lr29, Lr36, and Lr37 were included to confirm virulence. According to seedling virulence surveys the majority of isolates were virulent on lines with the resistance genes: Lr1, Lr2a, Lr3ka Lr2c, Lr3, Lr11, Lr14a, Lr26, Lr23, Lr30 andLrB. Virulence in genes, Lr16, Lr17, Lr18, Lr20 and Lr24 was high in both years. No virulence was found in Lr28, Lr29, Lr27+31, Lr41 and Lr42. Low virulence (1.8-13.2%) was recorded in genes Lr9, Lr19, Lr10 and Lr21. As compared with previous data, the virulence to lines Lr9, Lr19 and Lr24 had decreased. Sixteen pathotypes were described in *Puccinia triticina* population. The most common pathotype PTKNL, PKTTL and PFTPL were occurred in 14.0-12.3% of the isolates. Dominant pathotypes consist of 13-15 virulence genes. The existence and severity of leaf rust natural infection were assessed in two growing seasons on the 85 entries of Trap Nurseries (5^{th} ILRTN-14 and 6^{th} ILRTN-15). Resistance of 60 % of entries was indicated. Among them 34.1% showed R type. Moderate resistance to leaf rust have been expressed on lines with genes Lr17, Lr18, Lr19, Lr21, Lr28, Lr29, Lr37, Lr10+ 27+31.

Keywords: *wheat rust, virulence, resistance genes, pathotypes.*

ISOLATION OF INSECTICIDAL MOLECULES FROM CASSAVA AND FORMULATION OF BIO-PESTICIDES AGAINST SOME IMPORTANT PESTS OF HORTICULTURAL CROPS

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Abstract

Injudicious use of chemical inputs in agriculture poses challenge to sustainable agriculture. Cassava (*Manihot esculenta* Crantz) is a climate resilient crop cultivated in tropical and subtropical countries for its tuber as food, feed, and industrial products. Nevertheless, owing to the presence of Cyano glucosides, leaves and tuber rinds are often thrown as waste or rather underutilized. The insecticidal principles from such bio-waste have been isolated and made formulations to manage certain important pests of horticultural crops. The current management strategy relies upon application of very toxic synthetic insecticides, although complete control of the pests could not be achieved. An extensive laboratory and field study was conducted on insects of contact applications were possible. Excellent package of control was developed both by prophylactic and curative means against the banana weevil (*Odoiporous longicollis* Oliver and *Cosmopolitus sordidus* Germer) management and over many of the noxious pests of vegetable and fruit crops. Lethality studies suggest the scope of cassava bio-pesticides as an alternative over synthetic pesticides specifically to the borer and sucking pests. The thick waxy coating of mealy bug and white fly were a major hurdle to the synthetics to act while cassava bio-pesticide formulation removes it by a spray to expose it and kill. Dose, concentration and application strategies of the bio-formulation have been standardised individually for some of the major pests, and large scale validation was done at the farmers' fields in three geographically and agro-climatically distinct zones of Kerala state, India and established its potency to manage the dreaded pests.

Keywords: *Cassava bio-pesticide, Horticulture pest, Bio-pesticide, Tapioca insecticide*

TEXTURAL PROPERTIES OF WHITE CHEESE MADE OF IR PASTEURIZED MILK AND AGED IN KCL SUBSTITUTED BRINE

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Abstract

At present time the new methods are replacing the traditional food technologies with the potential to reduce production costs. Using infrared irradiation heat for milk pasteurization as a technology with the high thermal efficiency can be a good alternative to traditional methods of milk processing. In addition, by replacing potassium chloride instead of sodium chloride in the formula of the salt water of white cheese, the adverse health effects resulting from the consumption of sodium chloride can be prevented. In this investigation, by using the infrared radiation heat, raw caw milk was pasteurized and then white cheese produced from it. The white cheese was placed in four different formulations of brine containing 1) NaCl: KCl, 10:0 percent 2) NaCl: KCl, 7.5: 2.5 percent, 3) NaCl: KCl, 5:5 percent and 4) NaCl: KCl, 0:10 percent for 21 days at a temperature of 8° C. Then the texture characteristics of the cheeses were evaluated. Texture analysis of cheese showed that by reducing the amount of sodium chloride, the strength of cheese texture decreases and there was a significant difference between the strength of two types of produced cheeses.

Key words: *NaCl, KCl, White Cheese, Brine, Infrared pasteurizing.*

WHITE CHEESE PHYSICOCHEMICAL PROPERTIES MADE OF IR PASTEURIZED MILK RIPENED IN KCL SOLUTION

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Abstract

Using infrared irradiation heat for milk pasteurization as a technology with the high thermal efficiency can be a good alternative to traditional methods of milk processing. In addition by replacing potassium chloride instead of sodium chloride in the formula of the salt water of white cheese, the adverse health effects resulting from the consumption of sodium chloride can be prevented. In this study, by using the infrared radiation heat, raw caw milk was pasteurized and white cheese produced. The white cheese was placed in four different formulations of brine containing 1) NaCl: KCl, 10:0 percent 2) NaCl: KCl, 7.5: 2.5 percent, 3) NaCl: KCl, 5:5 percent and 4) NaCl: KCl, 0:10 percent for 21 days at a temperature of 8° C. Then the physicochemical characteristics of the cheeses were evaluated. Cheeses produced using two pasteurization methods of classic and infrared irradiation had significant differences in moisture and dry matter content.

Key words: *NaCl, KCl, White Cheese, Brine, Infrared pasteurizing.*

AGRICULTURAL ECONOMICS MANAGEMENT

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Abstract

Agricultural economics or agronomics is an applied field of economics related to the application of economic theory in optimizing the production and distribution of food. In recent years agricultural economists have studied diverse topics related to the economics of food consumption. In addition to economists' long-standing emphasis on the effects of prices and incomes, researchers in this field have studied how information and quality attributes influence consumer behavior. So, The Agricultural & Applied Economics Association (AAEA) is a professional association for those interested in the field of agricultural and applied economics. It refers to the part that Agriculture plays in countries global economy. This is in terms of the economic contribution that agriculture makes. The effect that it has on the economy is huge. Agriculture is one of a key groups of economic contributors which would cause economic collapse if it failed. Effects of mismanagement of the Agro economy are quite evident with the food riots that are being experienced in places like Haiti and Egypt because people basically cannot afford to buy food or are experiencing significant food shortages. In Iran, analysis of agricultural commodities prices is important both in economic and political aspects because Price transmission in different levels of market has some effects on producers and dealers' income and welfare and consumers' expenditure and welfare.

Key words: *agronomics, food, agriculture, economy.*

MILD TECHNOLOGIES FOR INACTIVATING FOOD ENZYMES

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Abstract

Microorganisms, enzymes and environmental aspects are the main factors in food spoilage. Control of microbial and enzymatic activity can extend the shelf life of foods. Enzymes in foods must be inactivated by selected technology for food preserving. In some foods, the intensity of heat treatments is determined by the high thermotolerance of some enzymes which are indicative of microbial thermotolerance. It means that it is not necessary to apply hard microbiological tests to ensure killing pathogenic microorganisms. In addition the techniques to inactivate enzymes in foods at reduced temperatures are of special interest to the food industry in producing high-quality, stable food products. For this reason in this article using moderate heating technology are emphasized. High pressure carbon dioxide (HPCD) method is a helpful non-thermal processing technique for inactivating enzymes in liquid and solid food systems. Various types of enzymes may cause undesirable chemical changes in food attributes, showing the loss in color, texture, and flavor such as lypoxygenase (LOX), pectin methyl esterase (PME), polyphenol oxidase (PPO). HPCD can be a good choice for inactivating enzymes without side effect on quality of foods. Combinations of pressure with moderate temperatures also can reduce enzyme activity. For example, inactivation of peroxidase (POD), polyphenoloxidase (PPO), and pectinmethylesterase (PME) in strawberry puree and orange juice by combining a moderate HHP treatment and heat for 15 min has been studied. Other methods would be also surveyed in this article.

Key words: *Enzyme, inactivation, mild technology, HHP, HPCD.*

SAFFRON AS A FUNCTIONAL FOOD FOR TREATING DISEASES IN A HOMEOPATHIC WAY

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Abstract

Every year, around 300 tons of saffron is produced worldwide in a belt of lands ranging from the Mediterranean in the west to Kashmir in the east. Iran produces about 76% (230 tons) of the entire world production of saffron. Due to long experience Iran has in cultivation and consumption of saffron and cultural influence of this plant,saffron has been used in many ways as a hair and clothes dye, in perfumes, for flavoring foods, as a food ingredient, for its organoleptical properties and for medical purpose for curing diseases which with all specifications it nowadays called as a functional food. On the other hand, one of the main areas of research in food science and technology nowadays is the extraction and characterization of new natural food ingredients with biological activity that can contribute to consumers' health as part of new functional foods. So the number of research on various aspects of food science pertaining to functional foods has increased dramatically, especially on saffron, which is the Iranian national plant. Moreover, in recent years there has been increased public interest in unconventional medicine such as homeopathy. At the same time, however, all countries have faced the need for reducing the public spending and cutting back the expenses for refundable treatments. As a result of such trend, this article studies various research and scientific references.

Key words: *gold plant, saffron, homeopathy, functional food*

BIOLOGICAL CONTROL OF FUSARIUM ROOT ROT DISEASE ON STRAWBERRY PLANT

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Abstract

The results of field survey which was conducted in greenhouses subsidiaries (the Plant Protection Department and the Department of Horticulture and plant cultivation Nineveh) in the province of Nineveh (Iraq) showed presence of many pathogens, especially fungal infect strawberry plants, and most frequently with the pathogenic fungus *Fusarium solani*, followed by *Fusarium oxysporium* in three mentioned plastic houses. The incidence varied in Fusarium root rot in field survey of the three sites and it was the highest in the greenhouse of the plant cultivation by of Nineveh 65%. This study is the first study of the most important diseases of strawberry. During the bio-test, we found many biocides fungal and bacterial in diameter growth of*F.solani*In vitro. We noted that the concentration of 100 mg of active ingredient/lLwas sufficient to inhibit growth.Bio-resistant containedthe active ingredient represented (T.h) *Trichoderma harzianum*, while there was no significant difference between bacterial biocides in the percentage of inhibition growth of pathogenic fungus.Test showed the effect of several biocides containing bacterial and fungal in the control of Fusarium root rot disease, in the greenhouse of the Plant Protection Department. We observed a difference in the rate and severity infectionof strawberry plants, between the biocides fungal and bacterial it's used, the bacterial biocide *Psudomonas fluorescens* superiority than the other Biocides and did not differ significantly from fungal biocide (T.h) *Trichoderma harzianum*.Throughthis study the impact of biocides on several charactersfor strawberry plants did not differ regarding biocides fungal and bacterial among themselves in terms of their impact on the improvement character of strawberry plants.

Key words: field survey, greenhouse, pathogen, strawberry.

STUDY EFFECT OF SOME PLANT EXTRACTS AQUATIC ON GROWTH SOME SEEDS BORNE OF WHEAT TRITICUM. AESTIVUM &,DURUM INVITRO IN LIBYA

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Abstract

Grain samples of four wheat cultivars in Libya were tested for seed –borne fungi by used two methods detection Blotter and Agar test including two cultivars Triticum durum wheat such as (Annaama , Beltagi) and two T, aestivum (Cham10 , Bo - hott 208).The results showed in the existence of eight seed borne fungi, including fungal pathogens of plants such as ,Fusarium spp ,Stemphylium spp , Alternaria spp , Cladosporium sp and saprophytic fungal such as Aspergillus spp ,A.niger , Penicillium spp , Aspergillus clavatus and ,Rhizopus stolonifer.Their more fungal hesitancy on seeds coat Pencillium spp and Rhizopus stolonifer ratio (78.1 , 60 %) respectively on cultivar T .drum while more fungal hesitancy by Media Agar test fungus Fusarium spp ,Cladosporium spp ,Pencillium spp ,Stemphylium spp ,Aspergillus niger ,A. clavatus a ratio (64.2 ,19.2 ,16.2 ,3.2 ,3.1 ,3.1 %) respectively and percentage of germination of selected cultivars, as well as the incidence infection rate may different depending on the cultivars of two methods and cultivars that the percentage of germination high recorded the lowest rate of infection in some fungi seed cultivars and caused malformations , discoloration , root rot and reduce lengths of planting and stopped growth in lethal roots. when testing the vital influence of aquatic cold of dry powder plant extracts medicinal in location study on growth pathogen Cladosporium spp inter incubator at 25 CO for one week until growth non treatment (Control) which isolated of wheat durum by used plant extracts leaves Thymus capitatus at concentrations (5, 10 %) While the extract to inhibit the growth of fungus a ratio (36.7 , 46 %) respectively, while action plant extract Capparis spinosa L inhibit growth fungi ratio (3,6.7 %) respectively Compared fungicide Raxil and recorded the percentage inhibition of fungi ratio (95, 98.5%) at concentrations as compared to the non-treatment.

Keywords: *Plants Extracts, Seed borne, Cladosporium spp*

INFLUENCE OF BIOFERTILIZERS ON SOIL MICROFLORA IN PRODUCTION OF SAFETY FOOD

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Abstract

The impact of biofertilizers on the dynamics of the total number of bacteria, fungi, actinomycetes and nitrobacteria and aerobic celulitic microorganisms in the soil has been examined. Tests were performed on different types of soils under crop of strawberry, Swiss chard and lettuce grown in two different regions in the Republic of Macedonia. The experiment with the three cultures was placed in random block system in two variants and three repetitions. Variants in the experiment were: Variant 1 - Control and Variant 2 - using microbiofertilizers. The biofertilizers were foliarly applied, with dorsal nozzle every fifteen days during the crop vegetation. The application of microbiofertilizers with strawberry started from the time of flowering of the culture, until the completion of harvesting the strawberry every fifteen days, and the chard and lettuce from planting the crop by the end of vegetation also every fifteen days. Microbiofertilizer has been used, the Microbiological fertilizer Slavon. Before the application the fertilizer gets dissolved in water 1:100 (100ml/10l). Before the application the microbiofertilizer agrochemical analysis of the soil was carried out. In the soil under crop of strawberry the neutral pH, average fertility in available nitrogen and phosphorus and good fertility with available potassium have been determined. In the soil under crops of lettuce and Swiss chard the neutral pH and good fertility with available nitrogen, phosphorus and potassium have been determined. We found that the application of microbiofertilizers affects the dynamics of microorganisms in the soil and increases their number during the vegetation in three cultures. The highest numbers of examined groups of microorganisms in the soil is found at the end of the vegetation in all three cultures, and the lowest number at the beginning of the vegetation. The use of microbiofertilizers affects the improvement of biogenosis and biological activity of the test soil, in order to produce environmentally safe and healthy product.

Keywords: *Microbiofertilizers, Soil, Microorganisms, Swiss chard.*

THE SPECIES OF SUPERFAMILY ICHNEUMONOIDEA – PARASITES OF APHIDOPHAGOUS HOVERFLIES

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Abstract

Aphidophagous hoverflies are one of the most important predators of *Myzus persicae*. The relationship between laid eggs of hoverflies, up to new emerged adults is very variable factor. Besides abiotic conditions, biotic interactions with other parasites can affect the survival of hoverflies. During tobacco vegetation, in the Prilep area, we applied the following methods: survey of 20 tobacco stalks and survey of 100 tobacco leaves, in 10 days interval. The prime material collected from the nature is cultivated and analysed in laboratory. We identified seven parasite species from superfamily Ichneumonoidea, emerged from pupae of hoverflies: *Diplazon laetatorius* Fabricius, 1781, *Diplazon* sp. 2, *Diplazon* sp. 3, *Homotropus* sp. 1, *Homotropus* sp. 2, *Sussaba* sp. 1, and *Promethes* sp. 1. The most numerous is the parasitic species *D. laetatorius*. It was registered as a parasite in: *Sphaerophoria scripta, Sphaerophoria rueppelli, Episyrphus balteatus, Scaeva pyrastri* and *Eupeodes corollae*. *Diplazon* sp. 2, *Diplazon* sp. 3 and *Homotropus* sp. 2 are parasites only in *S. pyrastri*. *Homotropus* sp. 1 is a parasite in: *S. scripta S. rueppelli, S. pyrastri* and *E. corollae. Sussaba sp. 1* and *Promethes sp. 1* are parasites in *S. scripta* and *S. rueppelli*. From the pupa of Syrphidae emerges one imago of parasite, that biting hole on rounded side of the pupa. The annual activity of these parasites is synchronized with the maximum availability of the larvae of their hosts. Parasitism occurs later in August, and during September. This data could be useful in implementation of Integral pest management.

Keywords: *aphids, Syrphidae, parasites, Ichneumonoidea.*

GENETICALLY-MODIFIED FOOD AND ITS IMPACT ON OVERCOMING MALNUTRITION

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Abstract

GM foods or GMOs (genetically-modified organisms) is most commonly used to refer to crop plants created for human or animal consumption using the latest molecular biology techniques. These plants have been modified in a laboratory to enhance desired traits such as increased resistance to herbicides or improved nutritional content. The enhancement of desired traits was traditionally undertaken through breeding, but conventional plant breeding methods were very time-consuming and often not very accurate. GM crops are now also being developed for the production of recombinant medicines and industrial products, such as monoclonal antibodies, vaccines, plastics and biofuels. Genetic engineering, on the other hand, can create plants with the exact desired trait very rapidly and with great accuracy. In 1983, the first genetically-modified plant was produced, using an antibiotic resistant tobacco plant. In 1990, China was the first country to commercialize the first transgenic plant. The Food and Drug Administration Authority approved commercial use of the flavor Savor Tomato in 1994. This genetic manipulation delayed the ripening after harvest. GM food, developed by using Bacillus thuringiensis (Bt), naturally-occurring bacteria found in the soil, , was made to provide in-plant protection from the yield-robbing Colorado potato beetle. This was brought to market by Monsanto in the late 1990s, developed for the fast food market 'Fortuna potato'. This GM potato was made resistant to late blight by adding two resistance genes, blb1 and blb2, which was originated from the Mexican wild potato Solanum bulbocastanum. The papaya was developed by using genetic engineering. It is resistant to the ring spot virus and thus has enhanced productivity. GM products which are currently in the pipeline include medicines and vaccines, foods and food ingredients, feeds and fibers. Locating genes for important traits, such as those conferring insect resistance or desired nutrients, is one of the most limiting steps in the process. FQuantification of a genetically-modified organism in food is done by using molecular techniques like DNA microarrays or qPCR. Different methods of quantification detection such as PCR (QC-PCR), real-time PCR and ELISA Quantification may also be a step towards the labeling of the genetically-modified food. The insertion of the Kanr gene in the tomato has no effect on its nutritional assessment of total protein, vitamin and mineral contents and toxic glycoalkaloids. GMOs for human consumption were introduced in 1997, in the Regulation on Novel Foods Ingredients (258/97/EC of 27 January 1997). This regulation deals with rules for authorization and labeling of novel foods including food products made from GMOs. When it comes to doing unintended harm to other organisms, pollen from B.t. corn have caused high mortality rates in monarch butterfly caterpillars. Unfortunately, B.t. toxins have indiscriminately killed many species of insect larvae. All foods contain significant amounts of DNA and RNA, consumed in the range of 0.1–1.0 g/day. 39 of potential concern is the possibility that the protein produced by the transgene may be toxic.

Key words: *Food safety, genetically-modified food, PCR, ELISA, environment, biodiversity, biofuel, toxicity*

ASSESSING VARIOUS WEED MANAGEMENT APPROACHES FOR WEED SUPPRESSION IN *ALLIUM CEPA* IN NORTHWESTERN PAKISTAN

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Abstract

Allium cepa L. an important vegetable crop in Pakistan and around the globe has been facing major production losses due to pest weeds. A field study in 2014 in northwestern Pakistan has investigated efficacy of various weed management approaches on *A. cepa* yield and yield components. The trial was set in RCB design having seven treatments Dual gold 960 EC,Stomp 330 EC, Oxyfen 24 EC, white polyethylene sheet, wheat straw and saw dust, and two hand weeding. A control was maintained for comparison. Hand weeding, Dual gold and Stomp gave significantly greater weeds density, fresh and dry weeds biomass reduction, and increased *A. cepa* bulb size and yield. The lowest weeds densities 39.5, 55.3 and 58.5 weeds m^{-2} were found for hand weeding, Stomp and Dual gold, respectively compared to control (169.8 weeds m^{-2}). Similar trend was observed for bulb yield by producing 13369.5, 13045.9 and 11753.0 kg ha^{-1} in hand weeding, Stomp and Dual gold plots, respectively compared to control (5466.8 kg ha^{-1}). However, results showed different trend for cost benefit ratio 1.0: 5.82, 1.0: 5.49 and 1.0: 5.23 for Stomp, Dual gold and hand weeding, respectively. Our results suggest use of Stomp and Dual gold for larger *A. cepa* fields where hand weeding may not be feasible due to the limited man power. Hand weeding could be used as an efficient weed management approach in smaller fields and where man power is plentiful.

Key words*:* *onion, weed management, northwestern Pakista, major weed losses.*

REDUCTION OF ENERGY DEMAND FOR DRYING GRAIN THROUGH HEAT RECOVERY FROM HUMID AIR EXTRACTED FROM DRYING ROOM

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Abstract

This paper outlines the method of reducing energy demand for drying grain through the use of heat recovery from humid air extracted from a drying room. The use of exchangers to recover heat from the extract air and to transfer the recovered heat to the cold, dry, external air results in a significant reduction of the primary energy demand for heating of the cold external air. At low external air temperatures, it is possible to recover, from the extract air, both the sensible heat and the latent heat from condensation of water vapour. Two design solutions with heat recovery have been presented, namely the heat recovery in exchangers with direct heat transfer from the extract air to the supply air and in exchangers with indirect heat transfer through transfer medium. For selected design setpoints of a drying room and design solutions with heat recovery, both the achievable reduction of the primary energy demand for thermal air treatment and the resultant increase in the energy demand for air transport, due to the use of exchangers, have been estimated. The energy balance of a drying room has indicated that the use of systems with heat recovery led to the significant reduction, of the energy demand for drying grain in range 20-30%.

Keywords: *Drying grain, Heat recovery, Energy demand.*

PRESENCE OF THE GRAPEVINE LEAFHOPPER SCAPHOIDEUS TITANUS IN VINEYARDS IN EASTERN ROMANIA (MOLDOVA REGION)

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Abstract

The North American grapevine leafhopper *Scaphoideus titanus* Ball 1932 (Hemiptera: Cicadellidae) is a major pest of grapevine in Europe, being the main vector of the phytoplasma pathogens associated with the *Flavescence dorée* disease. In 2016, a field survey was conducted to evaluate the presence of *S. titanus* in vineyards in Moldova Region, Eastern Romania. The research comprised sixteen vineyard plantations, newly created within the national program of reconversion and restructuring of vineyards developed in the country since 2011. Yellow sticky traps were used for sampling of leafhoppers. These traps were used to monitor the leafhopper population dynamics. The captures on the yellow sticky traps indicated that *S. titanus* was present in all investigated vineyard plantations. Its population was different in size from one plantation to another. On overage, 23 to 36 adults per trap were collected over the period from June to October 2016. There was no phytosanitary treatment applied against *S. titanus*.

Key words: *Scaphoideus titanus, Romanian vineyards.*

PHYSIOLOGICAL AND BIOCHEMICAL CHANGES IN GRAPEVINE LEAVES AFFECTED BY YELLOWING AND REDNESS SYMPTOMS

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Abstract

A study was performed to investigate changes in the content of pigments (chlorophylls, carotenoids), total polyphenols, and total and reducing sugars in the leaves of the three grapevine cultivars (Pinot Noir, Cabernet Sauvignon, Riesling, Traminer) collected at the Miniş-Maderat vineyard in Western Romania in 2016, naturally affected by symptoms typical to infections with phytoplasma. The results showed that the amount of total chlorophyll and carotenoids were markedly reduced in the leaves collected from the symptomatic vine plants of all the studied varieties. Similar results were obtained for the content of the total polyphenols compounds. The total sugars were also decreased in the leaves of the affected vines, compared to the healthy ones.

Keywords: *chlorophyll, polyphenols, leaves, total sugars, disease.*

THE ROLE OF TEMPERATURE IN THE FLIGHT DYNAMIC OF THE *HYALOPTERUS PRUNI* GEOFFR. ALATE FORM, AT THE AL. BUIA BOTANICAL GARDEN, CRAIOVA

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Abstract

Roses have enjoyed the honor of being the most popular flowers in the world for the longest time. With its vast collections of great diversity, the Al. Buia Botanical Garden from Craiova, owns living biological material for study and basic and applied research. Rose is attacked by numerous pests, amongst them, aphids are considered as a major pest. The rose aphid (*Macrosiphum rosae* L.), *Homoptera* Order, *Aphididae* Familiy, has a large area of spreading, being one of the main rose pest. During 2015 - 2016 at Al. Buia Botanical Garden research was conducted regarding the influence of the temperature on the flight dynamic of the alate form. The study has been conducted during May and the flight dynamic of the rose aphid alate form was recorded during 24 h, in five consecutive days. The flight activity of the winged aphids was maximal between 19° and 22°C. The flight begun in the morning, reduced in intensity during the day, especially if the temperature surpass 25°C, reaching a maximum in the evening, around 19-20 hours.

Keywords: *Macrosiphum rose L., Temperature, Flight dynamic.*

COMPARATIVE ANALYSIS OF GROWTH INHIBITION OF FUSARIUM OXYSPORUM CAUSED BY PSEUDOMONAS SPP. AND BACILLUS SUBTILIS

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Abstract

Biological control of plant diseases by using microorganisms provides a possible alternative to the use of chemicals in agriculture. Microbial biopesticides originate mostly from bacteria (78%). The wilt-inducing strains of *Fusarium oxysporum* are responsible for severe damage of many economically important plant species. The aim of this study was to examine effect of indigenous rhizobacteria *Pseudomonas* spp. and *Bacillus subtilis* against *F. oxysporum in vitro*. The antagonistic activities of several *Pseudomonas* strains and different concentration of *B. subtilis* strain obtained from rhizosphere of clover, maize and alfalfa were evaluated for antagonistic activity against *F. oxysporum* originating from potato. The antagonistic activity was studied by using dual culture method on Waksman agar. The results were shown as percentage of inhibition of the fungal growth. All tested bacterial strains possess several biocontrol traits. *Pseudomonas* strain K24 was the most effective, causing 78.97% of fungal growth inhibition. *Pseudomonas* B25, isolated from clover rhizosphere, and M28 isolated from rhizosphere of maize, were less effective (53.33 and 51.11%, respectively). *B. subtilis* strain Bs13 (in concentration of $8x10^6 CFUmL^{-1}$) inhibited fungal growth up to 73%. The antifungal effects of six lower concentrations (from $1x10^5$to $4x10^6 CFUmL^{-1}$) inhibited fungal growth over 50%. The lower concentrations exhibited a minor levels of inhibition compared to the difenoconazol used as standard, which showed 68% of inhibition. Strains K24 and Bs13, originating from alfalfa rhizosphere, were more effective than difenoconazol. *Pseudomonas* sp. K24 ($1x10^6 CFUmL^{-1}$) showed higher effectiveness in inhibition of *F. oxysporum* than *B. subtilis* Bs13 ($8x10^6 CFUmL^{-1}$) and difenoconazol. The results obtained in this study are promising and support the importance of further *in vivo* investigations of the antifungal capacity of indigenous rhizobacteria.

Keywords: *rhizobacteria, antagonistic activity, Fusarium oxysporum, Pseudomonas, Bacillus subtilis*

REGENERATION OF WASHINGTON NAVEL SWEET ORANGE (*CITRUS SINENSIS* L. OSB.) BY *IN VITRO* ORGANOGENESIS FROM FLORAL AND VEGETATIVE EXPLANTS

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Abstract

In a purpose of a viral sanitation strategy in Tunisia, citrus accessions from Washington navel (*Citrus sinensis* L. Osb.) variety have been investigated for regeneration throughout direct and indirect *in vitro* organogenesis. During the present experiment, either floral (style/stigma and ovaries) or vegetative organs (leaves, cotyledons, epicotyls and hypocotyls) were cultured into Murashige and Skoog (MS) culture media that were supplied with 5 different hormonal combinations of Naphtalène Acetic Acid (ANA), 2,4-Dichlorophenoxyacetic Acid (2,4-D) and 6-Benzyl-aminopurine (BAP). An average of 12 replicates/combination was adopted. As a result, Washington navel has been exclusively regenerated via indirect organogenesis. The highest rate of callogenesis was evaluated to 95% which was obtainedonly from style/stigma culturing on MS media enriched with 3 $mg.l^{-1}$BAP, then generated rooted plantlets at 100%. By acclimatization, a rate of 83% of the plantlets was successfully obtained. The major output afforded by this study is the highly successful regeneration of Washington navel sweet orange from style/stigma floral organs and using the appropriate media composition by contrast to the remaining studied explants in a sanitation and certification procedure.

Key words: *in vitro, organogenesis, style/stigma.*

THE DETERMINATION OF APPLIED WEED MANAGEMENT IN LENTIL IN DIYARBAKIR (TURKEY)

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Abstract

A questionnaire of 20 questions about weeds and herbicides, tillage and crop rotation was applied to 100 lentil farmers in order to evaluate the problems encountered in the control of weeds problematic in lentil fields in Diyarbakır in 2016. Results of the survey showed that most common weeds were 36% wild mustard (*Sinapis arvensis* L.), 16% corn buttercup (*Ranunculus arvensis* L.), 11% catchweed (*Galium aparine* L.), 8% cephalaria (*Cephalaria syriaca* L.), 8% low cornflower (*Centaurea depressa* L.), and the others (21%). It was determined that most farmers used aclonifen (89%) as a post-emergence to control broadleaf, besides clethodim (17%), haloxyfop methyl ester (26%), tepraloxydim (16%), quizalofop p-ethyl (15%) and fluazifop p-butyl (6%) for grass, and glyphosate (4%) as well. In addition, 66% of aclonifen reported that phytotoxicity was present. Growers take into account the price (43%), herbicides (38%), weeds (10%) and crop rotation (9%) to choose herbicides. It was realized that managing weeds with hand-picked (76%) was common in areas that did not use herbicides. Some preventive measures were used such as crop rotation (61%), late planting (10%), and deep tillage (4%). Furthermore, farmers planted wheat (91%) and barley (9%) as a preceding crop for lentil. As a result, it has been seen that the investigation of new herbicides (including preplant, preemergence, even postemergence) and as this crop was a poor competitor due to its short height and slow early growth. The development of herbicide tolerant lentil varieties are significant for lentil production.

Keywords: *Lentil, weeds, herbicides, hand-picking.*

EFFECTS OF DIFFERENT IRRIGATION LEVELS ON YIELD, QUALITY AND ORGANIC ACIDS OF CAULIFLOWER (*BRASSICA OLERACEA* L. VAR. BOTRYTIS) GROWN IN FIELD CONDITIONS

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Abstract

The field experiment was carried out at the Dardanos Agricultural Research Station of Canakkale Onsekiz Mart University in 2015, near Dardanelles straits in Canakkale province, Turkey. Irrigation interval (4-day) was fixed for all treatments and evaporation was determined by Class-A pan. In the full treatment ($I_{1.0}$), water in the root zone was refilled according to the amount of water evaporated from Class-A pan. In the deficit treatments, the water applied was 70% ($I_{0.7}$), 30% ($I_{0.3}$) and 0% ($I_{0.0}$) of full irrigation. The amount of seasonal irrigation water applied varied between 46.8 in the severe stress treatment and 360.9 mm in the full water application. Different irrigation levels in the treatments had significant effects on the yield, some quality parameters and some physiological characteristics of cauliflower (*Brassica oleracea* L. var. Botrytis) plants.

Keywords: *Cauliflower, Water stress, drought, sugar content, organic acids.*

TRADITIONAL CULTIVATION PRACTICES MAY EFFICIENTLY PREVENT THE VIRUS SPREAD IN SUSCEPTIBLE CROPS: A CASE STUDY OF TURNIP MOSAIC VIRUS IN UKRAINE

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Abstract

Turnip mosaic virus (TuMV) is a member of the largest *Potyviridae* family of plant viruses. For domesticated *Brassica* plants, TuMV is considered one of the most damaging and economically important viruses. TuMV is mainly transmitted by many aphid species non-persistently as well as mechanically from plant to plant. TuMV probably occurs worldwide and has been found in both temperate and subtropical regions of Africa, Asia, Europe, Oceania and North and South America. In Europe, TuMV was reported from the UK, Spain, Italy, Greece, Germany, The Netherlands, Czech Republic, Hungary, Bulgaria, Poland, and Russia. Despite Ukraine geographical location and wide cultivation of different *Brassica* crops for centuries, it has been only recently that the authors have registered TuMV in this country. In this study, isolates of TuMV were collected in Ukraine from naturally infected host plants, all from *Brassicaceae* family. For the first time, TuMV was shown to be widespread in agricultural and urban regions in Ukraine where it naturally infects crops, weeds and introduced species with infection rate reaching 50%. Also, we show that urban locations and concomitant weed plants are potent factors of virus epidemiology favoring extremely high virus incidence level of 89% in susceptible hosts. Importantly, we underpin the significance of trivial cultivation practices (crop rotation and eradication of diseased plants) as preventive measures for the control of damaging pathogen of brassicas, allowing for 3 times less TuMV incidence.

Keywords: *TuMV, Brassicaceae, cultivation, field, Ukraine.*

BIONOMY OF PEAR PSYLLA (*CACOPSYLLA PYRI* L.) IN EAST SARAJEVO AREA (BOSNIA AND HERZEGOVINA)

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Abstract

The pear psylla, *Cacopsylla pyri* L. (Hemiptera, Psyllidae) is one of the most important pests on pear in all regions where this fruit species is grown. This species is causing direct and indirect damages, thus reducing the yield and quality of the fruit. In addition, the application of molecular methods confirmed vector function this species in the transmission of phytoplasma „*Candidatus* Phytoplasma pyri“ which causes a dangerous disease, „Pear Decline“ (PD) and destruction of pears (Carraro et al., 1998). The survey was done in 2011 and 2012 in orchards, in locations Vojkovići, Kula, Tilava, Petrovići and Kasindo. Pear orchards were differ in age and growing module as well as in the other environmental characteristics such as altitudes and climate. Pear psylla was collected at different stages of development and examined in the laboratory - Faculty of Agricultural in East Sarajevo. Collected species were fixed in 70% alcohol, and preparations of adults and larvae were made in order to determination species. Bionomy of *Cacopsylla pyri* was examined in pear orchards and in laboratory on a sampled infested plant material.

Key Words: *Pear Psylla, development*

FOLIAR FERTILIZING SIDE EFFECTON CHERRY JUICE SHELF LIFE

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Abstract

At present time Foliar nutrition is known to be an efficient way of curing plant nutrient deficiencies and increasing plant qualities at specific physiological stages. In this method of plant fertilization nutrients solution sprayed directly to the plant leaves. Foliar nutrition can provide the nutrients required for normal development of crops in cases where absorption of nutrients by the roots system is disturbed. On the other hand cherry produced by foliar nutrition, can be susceptible to microbial spoilage. In our investigation, foliar fertilization by spraying balanced NPK solution fertilizer every two weeks during the growing season of cherry life. Then harvested cherry fruit juice was used for microbiological test. For this reason *Escherichia coli, Staphylococcus aureus, Streptococcus thermophiles, Saccharomyces cerevisiae* was cultured in TSB medium contained of cherry juice (0.5 %) via Broth Dilution Method. After samples incubationin 37 degree Centigrade, they were inspected after 48 hours. Results showed that microbial growths were increased in *Escherichia coli, Saccharomyces cerevisiae, Staphylococcus aureus* and *Streptococcus* thermophiles, respectively. As a result, foliar nutritioncould restrict the shelf life period of fruits contaminated by above microorganisms.

Key words: *Nutrition, NPK, Cherry, Tree.*

CHEMICAL COMPOSITION, ANTIOXIDANT AND ANTIBACTERIAL ACTIVITIES OF GREEN ALGA *ULVA LACTUCA* POLYSACCHARIDES

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Abstract

Green marine algae belonging to the genus Ulva are known for their fiber richness. The objective of this study was to evaluate the chemical composition as well as the antioxidant and antibacterial activities of *Ulva lactuca* polysaccharides. *Ulva lactuca* (green algae) was harvested on the rocks of Bousfer beach (Oran, Algeria). The polysaccharides extraction was carried out according to the method of Hwang *et al*. (2008) from the seaweed powder. The composition of carbohydrates, lipids, proteins, sulfate groups, and moisture of the extracted polysaccharides was determined. The antioxidant power was evaluated by DPPH scavenging, reducing power test and inhibition of β-carotene bleaching. The antibacterial activity of the *Ulva lactuca* polysaccharides was investigated by the diffusion method in agar, against nine bacterial strains (Gram+ and Gram-). The average composition of the polysaccharides indicated 54.14% of total sugar content, 7.87% of proteins, 1.25% of lipids, 21.52% of ash and 11.76% of sulfate groups. The antioxidant activity evaluation of the *Ulva lactuca* polysaccharides by the DPPH test revealed a dose-dependent antioxidant activity to reach 100% at a concentration of 4 mg / ml. The results also showed that the polysaccharides had the capacity to produce electrons for the reduction of Fe^{3+} ions to Fe^{2+}. In addition, the results indicated that the *Ulva lactuca* polysaccharides were effective in inhibiting β-carotene bleaching. Indeed, the activity increased from 36% to 0.05 mg / ml to 100% at a concentration of 1 mg / ml. According to the results of the antibacterial activity test, the polysaccharides of *Ulva lactuca* were effective against some of the tested bacterial strains (*Escherichia coli, Klebsiella pneumoniae*). Based on these results, *Ulva lactuca* could be valorized by its polysaccharides content, which is an interesting source of antioxidants, as well as effective inhibitor of pathogenic bacteria growth.

Key words: *polysaccharides, Ulva lactuca, chemical composition, antioxidant activity, antibacterial activity.*

CHEMICAL COMPOSITION OF THE MELISSA CLINOPODIUM BENTH ESSENTIAL OIL

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Abstract

Essential oils are natural products produced by plants for their own needs other than nutrition (i.e. protection or attraction). In general, they are complex mixtures of organic compounds that give characteristic odour and flavour to the plants (Ester R. Chamorro et al.,s.d.). The essential oil of the aerial part of Clinopodium vulgare synonym Melissa clinopodium Benth. was analyzed by GC/FID and GC/MS. Xylene was found to be the major component (48.68%). This oil is characterized by others constituents: Caryophylene oxide (23.18%), Ethyl benzene (15.16%), β- Caryophyllene (3.29%) and β-Cubebene (2.31%).

Keywords: *Melissa clinopodium, essential oil, xylene, Caryophylene oxide.*

THE STUDY OF THE CONTENT OF POLYPHENOLIC COMPOUNDS IN NATURAL WINE

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Abstract

Polyphenolic compounds are secondary plant metabolites known for their strong antioxidant properties. Wine contains a lot of polyphenolic compounds. These compounds play various physiological roles and are involved in protection against biotic and abiotic stress. As well, polyphenols in wine are associated with positive effects on human health. This paper focuses on the determination of selected polyphenolic compounds in the natural wine Riesling Weiss 2016 (Moravian region, the Czech Republic). The determination was carried out after fermentation, before the first bottling of the wine. The attention was focused on the determination of catechin, epicatechin, cis-piceid, cis-resveratrol, rutin, myricetin, quercetin, kaempferol, caftaric acid, caffeic acid, ferulic acid, and p-coumaric acid. The determination was carried out using high-performance liquid chromatography with UV / VIS detection. In addition, using the Folin-Ciocalteu method helped determine the content of total polyphenols. This method is based on the transfer of electrons in alkaline medium from phenolic compounds to phosphomolybdic/phosphotungstic acid complexes, which are determined spectroscopically at 765 nm. The most represented substance determined was caftaric acid, with a 52 mg/L content, and the least represented was ferulic acid (0.41 mg/L). Also, Pearson's correlation coefficient assessed the correlation between the individual components. Our results point to a high content of antioxidant substances present in wine.

Keywords: *wine, polyphenols, HPLC, natural method.*

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DETERMINATION OF ANTIOXIDANT PROPERTIES IN WINE FROM THE MORAVIAN WINE REGION (CZECH REPUBLIC)

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Abstract

Wine is a rich in antioxidant components, evidenced by numerous scientific studies. Wine contains non-flavonoids (hydroxycinnamates, hydroxybenzoates, and stilbenes) and flavonoids (flavan-3-ols, flavonols, and anthocyanins) antioxidant compounds. One way to determine and compare the content of total antioxidant components in wine is to detect antioxidant activity. This value quantifies the capacity of the biological sample to eliminate free radicals. The aim of this study was to determine the antioxidant activity and the content of total polyphenolic compounds in six varieties of white wines, namely, Green Veltliner, Muller Thurgau, Sauvignon, Palava, Pinot Blanc, and Traminer. These wines were made naturally in the wine region of Moravia (the Czech Republic). The antioxidant activity was determined spectrophotometrically using three principally different methods - DPPH• (2,2-diphenyl-1-picrylhydrazyl) assay, ABTS• (2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid)), and FRAP (Ferric reducing/antioxidant power assay). The content of total polyphenolic compounds was determined using the Folin-Ciocalteu method. The results of these analyses are expressed as the equivalent of gallic acid (GAE) in mg·kg−1. A strong positive correlation was found between the values of the antioxidant activity and the values of the total content of polyphenolic compounds. The highest values of the antioxidant activity and polyphenolic compounds were found in the variety Traminer, and the lowest in the cultivar Palava.

Key words: *wine, antioxidant activity, polyphenolic compounds, Moravian vineyards.*

Acknowledgement

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MASS PRODUCTION *OF FACULTATIVE* PARASITIC MITE, *AEGYPTUS RHYNCHOPHORUS* AS A NATURAL ENEMY AGAINST RED PALM WEEVIL IN EGYPT

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Abstract

The present investigation studies mass production *o facultative* parasitic mite, *Aegyptus rhynchophorus* on sugar cane inoculated with fungi *Memnoniella Sp*. and *artificial culture from Memnoniella Sp only* as biocontrol agents against Red palm weevil in Egypt. *Aegyptus rhynchophorus ectoparasite on pupae led to* deformed adult of red palm weevil reducing damage to palm by Red palm weevil. A new method for production *facultative* parasite mite and easy method that can be applied by Egyptian farmer. *Agyptus rynchophorus (Family: trachyuropodidae)* was propagated on sugar cane inoculated with fungi and culture from fungi only. The aim was to determine the success level of mass production of *Agyptus rynchophorus a*nd the duration of tray was 30 days, the unit was one tray. The number of parasite increased two fold with sugar cane inoculated with fungi and culture from fungi only. Biological aspects were determined such as life cycle, type of progeny, number of deposited egg, ovipositian period, preoviposition period, fecundity, incubation period and behaviour.

Key words: *Red palm weevil (R.P.W), Aegyptus rhynchophorus, Rhynchophorus ferrugineus, mass production, biological aspects, Egypt.*

PARASITISM OF THE WHEAT STEM SAWFLIES *CEPHUS PYGMAEUS* AND *TRACHELUS TABIDUS* (HYMENOPTERA: CEPHIDAE) IN NORTHERN IRAQ

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Abstract

Wheat Stem Sawfly (WSS) *Cephus pygmaeus* Linnaeus is one of the main insect pests that invades both barley and wheat in many regions of the world. Larvae feed on the contents of the host stem, resulting in empty or small-seed spikes. Natural enemies are one of the important integrated pest management components used to control this insect. A survey was conducted in some wheat fields in the Northern Iraq to determine the most common parasitoid species associated with this pest. Two hymenopterous species of parasitoids were recorded associated with the pest as new parasitoids in Iraq; *Collyria coxator*, Villers (Ichnoumonidae) and *Bracon terebella*, Wesmal (Braconidae). The overall ratio of parasitism reached 15%. The highest percentage was found in *C. coxator* 8.2%, followed by *B. terebella* with 6.8%. .

Keywords: *Parasitism, Wheat Stem Sawfly, northern Iraq.*

BIOLOGY AND CONTROL OF THE BROAD MITE POLYPHAGOTARSONEMUS LATUS (BANKS, 1904) (ACARI: TARSONEMIDAE)

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Abstract

The effect of feeding on two host plant species – pepper, Capsicum annum L. (Solanaceae) and cucumber, Cucumis sativus L. (Cucurbitaceae) on some biological aspects of Polyphagotarsonemus latus (Banks) was studied in a laboratory at 24 ± 2°C, 70 ± 5% RH and 16L: 8D photoperiod. The study showed that the pepper was a more suitable diet for P. latus than the cucumber, as revealed by shorter periods of developmental stages of mites and greater number of eggs, which are essential for mite survival and population build-up. The control studies included the evaluation of field efficiency of seven pesticides against different stages of pepper-infesting P. latus . The study revealed that Abamectin was the most effective pesticide, followed by liquid sulfur (Calcium polysulfide), canola oil (2% erucic acid rapeseed oil), orange oil (D-Limonene), Beauveria bassiana, Azadirachtin and 4.5% Matrine.

Key words: *Mites, pesticides, plant host*.

STUDY ON THE EFFECT OF SOME PRACTICAL PROCEDURES IN MANAGEMENT OF TWO-SPOTTED RED SPIDER MITES OF T.URTICAE KOCH RESISTANT TO DIMETHOATE

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Abstract

In order to control development of resistance of red spider mites to pesticides and to reduce the use of pesticides to keep the natural balance, the present experiments were carried out on female adults of two-spotted red spider mites T.urticae Koch resistant to Dimethoate. The results of the experiments with the Leaf-disk method with phaseolus vulgaris L. showed that the best procedure was a mixture with extract as antifeedant (Melia azedarach) causing of 91.25% mortality of susceptible strains and 88.74% mortality of resistant strains, while the mixture of antiecdysis (Flufenoxuron) resulted in the mortality of 63.76% and 47.47%, respectively. The present results suggest possible use of mixtures with antifeedant for strains resistant to organophosphate compounds as the primary procedure that may improve in future research.

Key words: *Management, spider mites, dimethoate.*

EFFECT OF MIXING ACARICIDES WITH SOME PLANT EXTRACTS ON THE TWO-SPOTTED SPIDER MITE TETRANYCHUS URTICAE KOCH THAT IS RESISTANT TO DIMETHOATE

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Abstract

In order to control change of pests from secondary pests to major ones, to reduce the quantity of pesticides, and consequently to reduce costs and pollution, we have carried out this study as the primary procedure.The research was conducted on adults of the two-spotted spider mite Tetranychus urticae Koch, which is resistant to Dimethoate, by using the Leaf-disk method with Phaseolus vulgaris L. The results showed that the best treatments were those comprising extracts such as Melia azedarach, Styrax officinalis and Yucca gloriosa, compared with the treatment that comprised pesticides alone, such as Biphenthrin, Azocyclotin and carbosulfan. The primary mortality was 90.11-73.36% for sensitive and resistant strains when we mixed Biphenthrin with Yucca gloriosa extracts, and 63.25-82.12% for two strains when we mixed it with Melia azedarach. When Carbosulfan was mixed with Yucca gloriosa the mortality was 60.45-80.32% for two strains. We compared these results with the efficacy of Biphenthrin and Carbosulfan alone, and the primary effects for two pesticides were 21.3-42.64% for two strains for Biphenthrin and 2.68-4.02% for Carbosulfan .When Abamectin was mixed with extracts, the results were not good because the mix reduced the efficacy of the pesticide. The results showed a possibility of using the mix of pesticides and extracts to increase the efficacy of pesticides and control the strains resistant to organophosphates as the primary procedure which must improve in carring out many research.

Key words: *Extracts, Tetranychus urticae Koch, resistant, Leaf-disk.*

ISOLATION AND CHARACTERIZATION OF ENTOMOPATHOGENIC BACTERIA FROM *GALLERIA MELLONELLA* (LEPIDOPTERA, PYRALIDAE) AND THEIR INSECTICIDAL EFFECT

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Abstract

In the past few years, considerable progress has been made to explain the disappearance of bee colonies, including correct identification of pests involved and the search for more effective and healthy alternatives to protect them. Indeed, our work is based on the isolation, characterization and identification of entomopathogenic bacterial strains of the genus *Bacillus* from larvae of wax moth *Galleria mellonela* reared in the laboratory, with a preliminary study of the use of these entomopathogenic bacteria on the larvae (L5) of *Galleria mellonella* under controlled conditions. In fact, 9 bacterial strains of the genus *Bacillus* have been isolated. They are spore forming bacteria, Gram and catalase positive and present variable responses to the oxidase test, gelatinase, lecitinase, caseinase, etc. From our study, we also find that the strain S4, probably identified as *Bacillus thuringiensis*, has a better effect on the larvae of Galleria mellonella. It caused very remarkable symptoms and behaviors with mortality rates that vary depending on the strain and bacterial concentration tested.

Keywords: *Galleria mellonella, Bacillus, isolation, larva, mortality.*

PRETREATMENT INFLUENCE ON THE DRYING RATE AND BIOACTIVE COMPOUNDS OF DRIED FIGS

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Abstract

Figs are delicious dried fruit consumed, and occupy a special place of importance in nutrition, and has numerous health benefits to offer as well, associated this with the presence of bioactive compounds. The aim of this paper was to investigate the influence of different alkaline solutions used as pretreatment on the drying rate and bioactive compounds content. The selected fig variety was "Roshnik" variety, and was studied in a batch operation in a laboratory dryer, at a preset drying temperature of 60^{o}C and constant air velocity. The constants of drying kinetics and mean apparent diffusivity of moisture for all pretreatment was calculated. Dipping figs in NaCl, $CaCO_3$, K_2CO_3, and lye solution increased the drying rate. Figs dried in 50248-61808 seconds depending on pretreatment for the same drying process parameters. The results showed that figs dipped in a 1% solution of potassium carbonate and sodium chloride to have shorter drying time. Also, application of 0.2 % of $K_2S_2O_5$ resulted to increase the quality of dried products. Applications of pretreatment should be taken under consideration for application to food processors for figs drying as they influenced positively in increasing the drying rate and the quality of the dried figs.

Keywords: *Ficus carica*, *drying rate*, *pre-treatment*, *polyphenols*

3. ORGANIC AGRICULTURE

THE CHARACTERISTICS OF ORGANIC FARMS AND OPERATORS IN ALBANIA: EVIDENCES FOR ORGANIC SECTOR DEVELOPMENT

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Abstract

There are three main driving forces in the development of the organic agricultural sector in Albania: the first pioneers, the foreign cooperation projects, and the government. While the foreign cooperation projects are the main stakeholders due to financial investments, the organic sector needs to become more sustainable and the government needs to learn more about it. The two main objectives of this socio-economic study are: filling the gap of knowledge in organic production, and showing evidence for the development of the organic agricultural sector in Albania. Complementary quantitative and qualitative research approaches have been carried out. The research work was divided into three phases: preparation, testing and data analyzing. Two tools were used in this study: rich conversational face-to-face semi-structured interviews and conducted surveys of farm economic performance with 57 out of 61 officially certified organic operators in 2009. The outcomes of these two tools provided useful statistical data and the elaboration of the characteristics of organic operators, their farms and organic market issues in organic sector in Albania. Finally, it was ended up with operators' opinion regarding to the future prospects of organic sector. The most relevant findings showed the small size of the organic sector in Albania and the presence of young and well-educated organic operators. The main organic production chains in Albania have been focused on fruit and vegetables, grapes (vineyard), olives (olive oil) and wild collection (medicinal aromatic plants and non-wood forest products). Despite all the technical and marketing problems, organic operators have had a positive attitude towards organic agricultural sector development.

Keywords: *organic sector, sustainability, organic market, organic farmers' need, qualitative research.*

FOUR NEW STRATEGIES TO GROW THE ORGANIC AGRICULTURE SECTOR

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Abstract

This paper presents four new strategies for growing the organic agriculture sector. Globally there are 51 million hectares of certified organic agriculture land and a further 39 million hectares of wild culture land. For the past two decades organic agriculture has been growing at 11.9% per annum, thereby doubling the size of the sector every six years. Nevertheless, despite ten decades of advocacy for organics, only 1.1% of the world's agricultural land is certified organic. From the outset, the strategy has been to advance the sector 'one farm at a time'. This strategy has left the organics sector well short of the vision of the pioneers of organics who saw organic farming as a universal solution and a practice suited for all farmers and all agriculture. Successful exemplars of marketing strategies of converting 'one consumer at a time' remain elusive. Recent years have seen the development of new strategies for growth of the organics sector. The strategy of 'one crop at a time' has proved successful for the Dominican Republic which now produces 55% of the world's certified organic bananas. The strategy of 'one state at a time' has seen the state of Sikkim (in India) declare itself as the first Indian organic state. Meanwhile, other Indian states are working towards all-organic status, including Mizoram, Goa, Rajasthan and Meghalaya. The strategy of 'one island at a time' has seen the Pacific islands of Cicia (in Fiji) and Abaiang (in Kiribati) commit to 100% organic farming. The strategy of 'one country at a time' sees Bhutan with the stated goal of being the world's first organic nation. These new strategies rely for success on the tripartite cooperation of government, community and commerce. In the meantime, as these new strategies play out, only 11 countries report that 10% or more of their agriculture land is organic, while 111 countries report that less than 1% of their land is certified organic, which reveals great potential for new growth strategies.

Keywords: *India, Sikkim, Bhutan, Fiji, Kiribati.*

THE EFFECT OF HYDRODYNAMIC CAVITATION ON THE PEAT ORGANIC MATTER

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Abstract

Hydrodynamic cavitation is an effective method of peat organic matter transformation which allows increasing the yield of alkali-soluble and water-soluble substances that may be used to substantiate new technologies of peat chemical processing. The theoretical significance of the research results consists in establishing the regularities of the transformation of water-soluble and humic substances in the process of peat hydrodynamic cavitation, the essence of which lies in the course of the opposite processes of destruction and condensation, the change in the sizes of polyconjugation systems and the molecular mass distribution of humic substances. The practical importance of experimental work is to establish the optimal parameters for the cavitation processing of peat. Under the influence of peat hydrodynamic cavitation the concentration of water-soluble substances is increased by 2.9–7.0 times and alkali-soluble humic substances by 1.8–2.0 times in comparison with the initial peat. This increase is undulating. In this way the specific energy costs and the consumption of raw materials and reagents will be significantly reduced. An additional amount of alkali-soluble humic substances is formed due to the conversion of the non-hydrolysable residue insoluble in the alkali humic substances as a result of its cavitation oxidation. The maximum yield of humic substances at 96–98 °C is achieved with the duration of cavitation treatment of peat suspension during 40–50 minutes. Study of the dynamics of humic substances extraction in time proves the usefulness of hydrodynamic cavitation treatment of peat.

Keywords: *Peat, organic matter, humic substances, hydrodynamic cavitation.*

ASPECTS OF ORGANIC FARMING IN BULGARIA IN THE CONTEXT OF SUSTAINABLE FUNCTIONING OF THE FOOD CHAIN

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Abstract

This exploratory study aims to analyze and evaluate the role of Bulgarian organic farming sector (1,1% share of UAA) and the extent to which this sector meets consumer requirements while considering the effects of behavior in consumption of foodstuffs on human health, environment and ecosystem; to make some conclusions about consumer needs for safe, healthy, high-quality and affordable food; determine priority measures to support the sector and improve its competitiveness. The object of the analysis is the organic production in Bulgaria, the trade with Bulgarian organic products, and consumers' behavior in the country. The logic of the market for organic products is largely determined by consumers demand and the extent to which organic sector meets consumers requirements. Therefore, one of the methods used is consumers'poll of organic products. The survey results provide information on identifying reasons and factors for the current condition of organic farming ; the attitude and motives of Bulgarian consumers and the reasons for this attitude, disclosure of relationships in different phases of bio-food chain and on this basis identified opportunities and interest in this type of production in Bulgaria as well as recommendations and options for its future development.

Keywords: *Organic farming, national and CAP, sustainable functioning, consumer demand and motivation*

INCREASE IN ORGANIC CONSUMPTION AND IMPROVEMENTS INDIETARY HEALTH

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Abstract

International and Danish studies have shown that consumers with large organic budget shares tend to follow the official dietary guideline more closely that other consumers. This appears to indicate that whether or not organic products are intrinsically healthier than their conventional counterparts there is a positive correlation between organic food consumption and dietary health. However, knowledge concerning the extent to which wider consumption of organic food would lead to an increase in consumers' observance of the official dietary guidelines remains unknown. Therefore, the overall purpose of this study was to analyse the dietary composition of households that substantially increase their organic consumption, before and after their increase in organic consumption. The study was based on data from GfK-Consumer Tracking for 2006-2014. The data included registrations of purchases of daily commodities made by a panel of approximately 2,000 Danish households. Besides details such as product type, volume, and quantity the data set encompassed background household characteristics such as age and gender. In the analysis an improvement in diet was defined as increased intake of vegetables, fruits, or whole grains and decreased intake of meat or fat/confectionary. Preliminary results indicated that consumers who increased their organic consumption in general had a relatively healthy diet before the increase occurred. Hence, the higher organic consumption was not accompanied by substantial dietary changes. On the other hand, it was found that an interest in a healthy diet could be the driver of increased organic consumption.

Keywords: *organic consumption, dietary health, purchase data.*

EFFECT OF COMPOST AND PHOSPHORUS APPLICATION ON GROWTH, YIELD AND P-UPTAKE OF DURUM WHEAT ON CENTRAL HIGHLAND OF ETHIOPIA

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Abstract

A field experiment was conducted to investigate the effect of compost and phosphorus application on growth, yield and P-uptake of durum wheat in vertisol of Debrezeit Agricultural Research Centre during 2011. An experiment with six levels of phosphorus (0, 46, 69, 92, 115 and 138 kg P_2O_5 ha^{-1}) and three levels of compost (0, 10 and 20 tonnes ha^{-1}) were laid out in a Randomized Complete Block Design with three replications. A durum wheat variety known as Ude was used for the study. The main effect due to compost rates highly significantly influenced most of the agronomic parameters and significantly affected days to physiological maturity and grain protein content. Moreover, the interaction effect of phosphorus and compost highly significantly affected tiller number, spike length, harvest index and grain protein content and significantly influenced plant height, number of grains per spike, grain yield, straw yield and biomass yield. However, the main effect of phosphorus had no significant influence on all parameters except days to physiological maturity. Highest compost application resulted in the highest number of fertile spike, thousand kernel weight and grain protein content. Similarly, the highest plant height (73cm), spike length (4.917cm), number of tillers $plant^{-1}$ (3.77), number of grains per spike (41.69), grain yield (2922 kg ha^{-1}), straw yield (4290 kg ha^{-1}), biomass yield (7212 kg ha^{-1}) and harvest index (40.52%) were obtained from combined highest level of both fertilizers. The grain; straw P concentrations and uptake of the nutrient increased with increased application of compost and phosphorus. Application of phosphorus alone did not affect most of the parameters studied. It could, thus, be concluded that applying compost in combination with mineral phosphorus fertilizer enhanced production of biomass as well as grain yield of the crop.

Keywords: *Compost, Phosphorus-Uptake, Durum Wheat.*

PATTERNS OF HERBACEOUS PLANT SPECIES RICHNESS, COMPOSITION AND SOIL PROPERTIES IN AN ORGANIC CULTIVATION "*LEMON VERBENA*" AND ABANDONED AGROECOSYSTEMS OF GREECE

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Abstract

Aromatic plants constitute a major segment of the flora, which provides raw materials for use in the pharmaceuticals, cosmetics, and drug industries. *Lemon verbena* is one of more than 30 species of aromatic shrubs in the genus *Aloysia* (family Verbenaceae) with high environmental and economic value. More attention is paid in Greece to the *Lemon verbena* essential oil while their effects on the parameters influencing multiple aspects of ecosystem structure (e.g. biodiversity, soil properties etc) are generally overlooked. Hence, this exploratory study aims to evaluate the effects of *Lemon verbena* and neighboring abandoned (10 years) ecosystems on the herbaceous plant species richness and composition, and soil properties. Also, the multiple regression method was used to investigate the relationship between herbaceous plant species richness and soil properties. The study was conducted in April-May 2016 and 2017 of central Greece. In total, 24 species of herbaceous plants (16 plant species in *Lemon verbena* ecosystem and 12 plant species in abandoned ecosystem) were recorded in the study area. The most frequently occurring plant was *Avena sterilis* (Family: Poaceae) in both types of ecosystems. Moreover, there were significant differences ($p<0.05$) between *Lemon verbena* and neighboring abandoned (10 years) ecosystems for any of the soil properties [soil organic matter, pH, $CaCO_3$, P, K and Mg] measured. Furthermore, multiple regression method showed that soil properties had significant effects on herbaceous plant species richness in which soil organic matter, pH, P and K were the most prominent factors influencing species richness in *Lemon verbena* ecosystem.

Keywords: *Aromatic Plant, Species Richness, Environment, Sustainability, Greece*.

YIELD PRODUCTIVITY OF SAGE (*SALVIA OFFICINALIS* L.) ORGANIC CULTIVATION UNDER DIFFERENT WATER AND NITROGEN INPUTS AND PLANT POPULATIONS IN CENTRAL GREECE: FIRST YEAR RESULTS

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Abstract

Sage herb (*Salvia officinalis* L.) comprises an important medicinal and aromatic plant, well-known for its various uses in medicine, as well as in cosmetic and food industries. The present work focuses on the productivity of a biologic cultivation of sage, obtained in the first growth (establishment) year under different water and nitrogen inputs and plant populations on a SL soil in central Greece. A split-split plot field experiment was established in three replicate blocks in November 2016. Rainfed and irrigated condition applied comprised the main plots with the irrigated plots receiving 100% of ETo (100 mm) until the harvest of the crop in late May 2017. Plant population in two levels (D1: 20x50cm, D2:40x50cm) comprised the subplots and in the sub-sub plots nitrogen fertilization in three levels (N0:0, N4:40, N8:80 kg Nha^{-1}). The results showed the positive effect of irrigation on yield traits such as plant height, chlorophyll content and dry matter produced, especially for the denser plant population. Actually, irrigation increase sage yields in half: from 900 kg dm ha^{-1} (rainfed crop) to over 1500 kg ha^{-1} for the plants receiving 100 mm of irrigation water. The positive effect of irrigation was significantly more pronounced to the denser population, whereas nitrogen fertilization did not show a significant effect on productivity, apparently due to the high fertility status of the studied soil. Such results are important and may assist future cost/benefit analyses concerning the introduction of sage as an important aromatic/medicinal plant in crop rotation schemes in near future in Greece and more generally in Mediterranean places.

Keywords: *Sage, irrigation, fertilization, plant density, aromatic plants, medicinal plants.*

ORGANIC AMENDMENT EFFECTS ON POTATO GROWTH AND YIELD

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Abstract

Field investigation was carried out to study the effect of integrated nutrient management on growth and yield parameters in potato var. Kufri Bahar under North Indian condition (2015-2016). The experiment was laid out in a randomized block design with twelve nutrient management practices organic manures, *viz*. farmyard manure (FYM), vermicompost (VC), neem cake (NC) and their combinations with inorganic fertilizers. Growth parameters like plant height, number of leaves per plant, number of stems per plant, fresh and dry weight of leaves per plant and yield attributing parameters like fresh and dry weight of tuber per plant and total yield per hectare increased with the application of vermicompost in different combination rates with inorganic fertilizer was much better than applying of neem cake one and the using of farmyard manure with them in tries combinations were the most effective treatments comparing with the others. However, highest values for number of tuber per plant and per plot as well as tuber yield per plot and per hectare was recorded on application of fertilizer mixture of 50% recommended nitrogen + 25% recommended nitrogen through FYM @ 7.5 t/ha + 25% recommended nitrogen through VC @ 2.25 t/ha was the most effective treatment followed by 75% recommended nitrogen + 25% recommended nitrogen through VC @ 2.25t/ha, respectively. The highest dry matter (18.84%) and maximum specific gravity (1.093) was recorded on application of 50% recommended nitrogen + 25% recommended nitrogen through FYM @ 7.5 t/ha + 25% recommended nitrogen through VC @ 2.25 t/ha.

Keywords: *Potato, Organic manure, Vegetative growth, Tuber yield.*

FACTORS AFFECTING ATTITUDE OF FARMERS TOWARD ORGANIC FARMING IN KHUZESTAN, IRAN

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Abstract

Organic farming is assumed to have the capacity to help reduction of negative economic, social and environmental impacts of green revolution, by supporting small scale farmers, meeting consumers' needs, and decrease in using chemical inputs. In line with this, during 2014-2015, a survey study was undertaken to investigate the factors affect farmers' attitudes towards organic farming. A random sample of 121 farmers was selected from west part of Iran. A multi-scale questionnaire to measure variables of general attitude toward organic farming, knowledge, perception toward economic, ecological and social goals of organic farming, perceived barriers and benefits of organic farming, and information channels, was administered to collect data. Analyzing data revealed that none of the respondents manages their farms based on organic farming style. They even do not perform soil test to learn about optimal consumption limit of fertilizers. They use higher rate of urea consumption than the optimal limit of 50 kg/ha advised by experts. Although, respondents' knowledge and attitude toward organic farming were relatively moderate (2.38 and 2.52 out of 5, respectively), their perception towards organic farming barriers (3.48 out of 5) and social goals (3.6 out of 5) showed a better status. They also highly perceived benefits, economic and ecological goals of organic farming. At last, the study concluded that to plan for changing farmers' attitude to cultivate based on organic farming a mixture of significant predictor factors including perception about ecological goals (β=0.55), perceived barriers (β=-0.54), knowledge (β=0.30) and social goals (β=0.25) must be taken into attention

Keywords: *Organic farming, Attitude, Perceived barriers, Perceived benefits, Iran.*

UNDERSOWN EFFECT IN WEED MANAGEMENT IN ORGANIC CROPPING SYSTEMS

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Abstract

The main reason for controlling weed abundance in agricultural crops is the risk for qualitative and quantitative reductions in crop yields. Although there are no simple standard solutions available for weed control in organic agriculture, however, some cultural practices—in particular, undersow in spring cereals—can be critical components of weed management. To study this thesis, specific research has been carried out in the CORE Organic Plus PRODIVA project in six northern European countries—Denmark, Finland, Germany, Latvia, Poland & Sweden. Density of weed species were assessed in 109 organic fields situated in different agro–ecological conditions of region. The highest number of weed species fixed in surveyed fields was 93 (in Denmark). The most challenging weed species in organic spring sown cereals in the geographical area of the Baltic sea fixed in all project partner countries were *Chenopodium* spp., *Polygonum* spp., *Elymus repens, Cirsium arvense., Centaurea cyanus, Galeopsis* spp. and *Eguisetum arvense*. *Galium* spp. were associated with cropping of wheat. It was found that cover crops undersown in spring cereals effectively suppress post-harvest weed growth, if properly established, and provide that a dense and fast growing canopy can be achieved. Especially, cover crop mixtures with clover species undersown in cereals in spring produce dense and suppressive canopies. Crop species mixtures, such as cereals + grain legumes change the growth rate and architecture of crop canopies. Noxious weed species were better suppressed as compared to sole crops.

Keywords: *weed management, spring cereals, organic farming.*

INFLUENCE OF MANGANESE FERTILIZER ON GRAPES EFFICIENCY ON SANDY SOILS OF THE SOUTH RUSSIA

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Abstract

As a result of the studies, there has been obtained a new information about manganese influence on productivity of grape plantations on sandy soils of the South Russia. Manganese fertilizing of 4 kg active ingredient per 1 ha on the background addition of nitrogen 90 kg/ha, phosphorus 90 kg/ha and potassium 90 kg/ha into a phase of grape sap flow contributes to higher yields and increase the sugar content of the berries with a significant decrease in juice acidity as compared with other variants. Our investigations on study of Platovsky grapes leaf surface development showed that upon depending on the dose and timing of manganese fertilizers, the number of leaves on one bush, area of the leaf blade, as well as the total area of leaves on one bush on 1 ha change. On determining the average weight of the fruit mass there has been found that manganese stimulates growth of berries significantly increasing their weight. The greatest effect of manganese fertilizer insertion is achieved on introducing it into the phase of sap flow at a dose of 4 kg/ha on the background of N90, K90, P90. In order to expedite the recovery of vineyards damaged by frosts to enhance the development of reproductive organs 4 kg/ha manganese into the phase of sap flow must be introduced on sandy soils.

Key words: *grapes, soil, mineral nutrition, manganese, productivity.*

Acknowledgement

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APPLICATION OF THE NEW ORGANO-MINERAL COMPLEX GEOTON IN THE CULTIVATION OF CROPS

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Abstract

The increase of the scales and levels of contamination with radionuclides and chemical toxicants in soils of agriculture determines the need to work out new technologies for reducing their transition to crop and livestock production. On the other hand, new agromeliorants and preparations should ensure an increase of soil fertility and crop yields. A new organic-mineral complex based on peat has been developed at the Russian Institute of Radiology and Agroecology. GEOTON contains potassium humates 9-12%, nitrogen (N) 9-14%, phosphorus (P_2O_5) 23-25%, potassium (K_2O) 23-29%. The results of the studies showed a positive effect of the GEOTON or organic-mineral complex on the microbocenosis of the root zone of spring barley. Processing of spring barley seeds by GEOTON slowed the processes of destruction of organic matter in the soil. Pre-sowing seeds treatment by GEOTON decreased 1.5-2.0 times the mineralization/immobilization coefficient of organic matter, increasing the index of Nikitin's pedotrophy by 2.0-3.0 times. Production tests of various soil and climatic zones of Russia showed that the productivity of winter and spring wheat increased by 10-35% when processing GEOTON crops and oats - by 10-40 potato tubers - by 15-30%. Organo-mineral complex reduces the accumulation of heavy metals (Cd, Pb, Ni) in barley and oat grains in 1.3-1.9 times. In conclusion, this study has has shown that GEOTON is an effective organo-mineral complex. In addition it could solve the problem of increasing the yield of normatively pure crop production while maintaining the microbiological activity of the soil.

Key words: *Organico-mineral fertilization, GEOTON, Cereals productivity, heavy metals*

BIOFERTILIZER BASED ON SILICATE SOLUBILIZING BACTERIA IMPROVES PHOTOSYNTHETIC FUNCTION OF BRASSICA JUNCEA

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Abstract

Usage of biofertilizers is one of the important components of integrated nutrient management, as they are renewable source of plant nutrients, ecologically safe compared to chemical fertilizers and cost effective. Silicate solubilizing bacteria (SSB) can play an efficient role not only in solubilizing insoluble forms of silicates but also potassium and phosphates, hence increasing soil fertility and thereby enhancing plant productivity. The aim of this study was to investigate the influence of SSB-enriched biofertilizer on the structural and functional parameters of photosynthetic apparatus of *Brassica juncea* (L.) Czern. The pure culture of SSB (*Bacillus sp.*) was isolated from the clay substrate and cultivated on Zak–Alexandrov medium. To obtain the biofertilizer, SSB culture ($0.6*10^8$ cfu mL^{-1}) was mixed with steriled peat (1:1, v/w) and dried at 35–40°C. Plants were grown from seeds during two months in the pots with adding SSB-enriched biofertilizer to the mixture of clay and soil (1:10, w/w). The clay substrate plus peat without SSB was used as a control. It was found that addition of SSB-enriched biofertilizer significantly increased the content of total nitrogen, phosphorus and potassium in *B. juncea* leaves. The thickness of mesophyllic layer and the number of mesophyll cells were increased on average by 24 %. It was correlated with a sharp increase of photosynthetic pigment content and CO_2 uptake (1.5–2.0 times). We can conclude that SSB-enriched biofertilizer improves the photosynthetic function of *B. juncea*.

Keywords: *Biofertilizer, Silicate solubilizing bacteria, Indian mustard, Photosynthesis*

Acknowledgement

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THE EFFECT OF TWO ROTATION SYSTEMS ON ROUGHAGE, ENERGY AND PROTEIN FEED YIELD IN ORGANIC FORAGE CULTIVATION

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Abstract

Organic animal feed is the basic element for organic animal production. In our country, in organic animal feed farming, farmers generally prefer forage crops as by-products and do not follow an alternation system for animal feed production. They make feed production either as inter-crop or as second crop. For this reason, there is no production based on an alternation system in which the animal can meet all nutritional needs. In the same season in the production of organic animal feed, roughage, energy feed and protein feed are needed to meet all animal nutritional values. The cultivation of these feed plants can be achieved with a good rotation system. However, most of the farmers do not know which rotation system give more organic feed. For this reason, yields of some plants suitable for Aegean Region conditions have been examined in 2 different rotation systems. In this study carried out in Menemen Plain, in Aegean Region, Izmir, Turkey during a period of 4 years between 2013 and 2016 the effect of two different rotation systems on the roughage, energy and protein feed yields in organic feed cultivation was studied. According to the results of soil analysis, organic fertilizer containing 2 % N, 2.5 % P2O5, 2.5 % K2O, 60 % organic matter and 9/12 C/N was given to the plots. Fertilization was carried out so as not to exceed 170 kg / ha nitrogen as stated in the organic farming law. In the first rotation system vetch/triticale mixture - cotton, Persian clover - silage corn, vetch/triticale mixture - cotton and Persian clover - silage corn were evaluated. In the second rotation system vetch/triticale mixture - soybean, vetch/oats mixture - corn, vetch/triticale mixture - soybean and vetch/oats mixture - corn were evaluated. In both systems roughage (vetch/triticale mixture and Persian clover) yield decreased in consecutive years, but subsequent energy (maize) and protein feed (soybean and cotton seed) yields were increased.

Keywords: *Organic forage crop, Protein feed, Energy feed, Crop rotation, Yield.*

THE EFFECT OF TWO DIFFERENT ROTATION SYSTEMS ON SOIL ORGANIC MATTER IN ORGANIC FORAGE CULTIVATION

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Abstract

Crop rotation has a key role in improving the soil and increasing the yield. Crop rotation with legumes, recycling of crop residues and the application of organic manure must form the basis of nutrient management in organic farming. Presence of legumes in rotation may serve as the primary source of nitrogen for subsequent crops. Most deficiencies in the soil are directly linked to low organic matter content. Organic matter has a very crucial significance for soil fertility improvement. The aim of this study was to determine the effects of some plants used in animal feeding on soil organic matter (SOM). For this purpose some certain plants have been selected and tested in two different rotation systems. This study was carried out in Menemen Plain, in Aegean Region, Izmir, Turkey during a period of 5 years between 2012 and 2016. Trial was set up in a randomized block design with four replications. According to the results of soil analysis, organic fertilizer containing 2 % N, 2.5 % P2O5, 2.5 % K2O, 60 % organic matter and 9/12 C/N was given to the plots. Fertilization was carried out so as not to exceed 170 kg / ha nitrogen as stated in the organic farming law. In the study, the fertilizer applications required by the plants were made considering the residual nitrogen from the plant roots. In the first rotation system Persian clover - silage maize, vetch/triticale mixture– cotton, Persian clover - silage maize, vetch/triticale mixture – cotton, in the second rotation system Persian clover - silage maize, triticale (grain) – second crop soybean, Persian clover - silage maize, triticale (grain) – second crop soybean were consecutively cultivated for five years. Soil organic matter (SOM) in soil samples taken from 0-20 and 20-40 cm in rotation system mentioned above was analyzed. According to analysis results, plant in the first rotation system affected SOM better than those of the second rotation system. It can also be stated that selected crops play an important role in SOM.

Keywords: *Crop rotation, Organic forage crop, Soil organic matter* (SOM).

COMPARISON OF AGROECOLOGICAL MANAGEMENT METHODS TO CONTROL OROBANCHE SPECIES IN TURKEY

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Abstract

Broomrapes (*Orobanche*spp.) are holoparasitic weeds and their management is very hard and expensive in the world. They are particularly problem in the Mediterranean countries or countries which have a Mediterranean climate. They cause yield losses up to 100% in sunflower, tomato, potato, lentil, tobacco, fababean and other crop. Until today, a successful management against this weed has not been achieved. So, alternative and sustainable management methods are gaining more importance. This study is the comparison of data from our various projects on the different management methods (different mulching and hoeing, ecological herbicides) of *Orobanche crenata, O. aegyptiaca*and *O. cernua* in terms of effectiveness and cost. The results show that some methods were more effective and economical than conventional herbicide applications. For example, direct spraying of acetic acid, citric acid, amino acid salt, clove and cinnamon oils on broomrapes have provided very good results. Additionally, application of mulching textile on row of crops has controlled broomrape nearly 100%. Hoeing and hand weeding were not applicable in the largest agricultural lands. Biological control, sowing date of the crop plant and crop rotation were the best sustainable methods for management of Broomrapes.

Keywords: *Broomrape, Mulching, Hoeing, Agroecology, Herbicide.*

EFFECT OF TILLER AND COB REMOVAL OF SWEET CORN ON FRESH/BABY CORN YIELD AND SOME CHARACTERISTICS

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Abstract

There is an increasing demand for baby corn which is the ear of maize plant from consumers and food producers because of its high nutritional value, preferable flavor and almost free from pesticides. The aim of this study was to determine the effects of removing tiller, second cop on fresh corn yield and its characteristics, also to investigate the possibility of usage second cop as a baby corn. The field trials were conducted with a BATEM sweet corn type from 2014 to 2015 in Isparta, Turkey. Randomized complete block design with three replications was used. Tillers and second cobs were picked off from corn after three days of the tasseling while fresh cobs were harvested at the end of milk period. Weight, diameter, length, yield, fresh ear number per hectare and fresh grass yield values were measured on both fresh and baby corns. Removing of tillers and second cobs significantly affect the yield and other properties of fresh cobs in the both years. Highest ear length, diameter and weight were determined from the tiller + the second cob removal practices. The highest fresh ear yield and baby corn number were determined from the control practices. There was no significant difference between different trials in terms of ear length, diameter and weight. It was observed that removing of tillers and second cob was providing positive contribution to development of main cob. Therefore, these baby corns could be consumed as fresh, frozen, canned and/or evaluated in food industry for variant purposes.

Keywords: *Sweet corn, Baby corn, Ear yield, Tiller removal, Food industry.*

SOME STUDIES CARRIED OUT ON ORGANIC FRUIT PRODUCTION IN TURKEY

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Abstract

Organic fruit growing, a branch of organic agriculture, has a short history in our country. Nevertheless, it is clear that the branch is a hot prospect for the future and needs much attention and development if we are to consider its area and amount of production as well as the opportunity of exportation. In this context, organic fruit production in Turkey started with the demands of European companies in 1980s and made substantial developments over the years. Although Turkey has suitable ecological conditions and export potential for organic fruit production, the share of Turkish organic products in the world market is significantly low. Some organic fruit productions are done for some fruit species especially strawberry, cherry, apricot, peach, olive, pomegranate, walnut, almond, apple, mulberry and pistachio in some areas of Turkey. Some studies have been done on these fruit cultivars in our country. Nevertheless, Turkey is not at the desired level and there is need for maximizing its potential. Lack of research work and lack of knowledge of farmers on organic farming and high production costs are the main reasons which in turn bring about insufficientincreases in organic production. The aim of this article is to grab readers' attention to some research studies carried out in organic fruit production in Turkey and encourage farmers to grow organic fruits.

Keywords: *Organic fruit species, Potantial production, Turkey.*

THE CAUSAL ANALYSIS OF FARMERS' ATTITUDES TOWARDS ADOPTION OF ORGANIC FARMING PRACTICES: EVIDENCE FROM TURKEY

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Abstract

Acceptance of technology innovations is complex issue. Moreover, there is little known on farmer's perceptions and attitudes towards acceptance of organic agricultural practices. This paper investigates the behavioral drivers of farmers with respect to the adoption of organic practices by comparing conventional and organic farmers. The attitudes of farmers in relation to adoption of organic farming practices are examined by comparing Turkish organic (N=131) and conventional (N=144) growers. The modified model from related models which are proposed in the context of the study has adapted and used to enhance a comprehensive analysis of the farmers' adoption decisions. The partial-least squares-structural equation modelling based multi-group analysis was performed in order to investigate group differences. The estimation results showed significant differences between the groups. The group comparison indicated that perceived output quality, perceived costs, and perceived usefulness have influences on the attitudes of farmers' decisions with respect to organic farming practices.

Keywords: *Adoption, organic farming, attitude, adoption, partial least square, structural equation modeling*

RECENT EVOLUTION OF THE CONSUMPTION OF ORGANIC FOOD PRODUCTS IN BELGIUM

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Abstract

The consumption of organic food products in Belgium increased significantly and continuously between 2008 and 2016, growing from 1.5 % to 3.2% of the total consumers' expenses for fresh food products. Nine percent of Belgian families buy organic food products at least once per week and represent 60% of the total expenses. The total expenses per capita reached nearly 33€ in 2015. The main expenses concerned dairy products (6.72 €/capita), vegetables (5.57) and fruits (4.40). These expenses have been globally increasing. The market share of organic products considerably varies from one type of food products to another: it is the highest for meat substitutes (24.6% in 2016) and eggs (14.0%), while it reaches 3.0% for dairy products, 6.6% for vegetables and 4.3% for fruits. These percentages have been globally increasing during the last years. Vegetable products have been proportionally more sold than animal products compared to the situation in the conventional market. Supermarkets and specialized shops are the most common distribution channels, direct sales on farms and open markets remaining marginal. Families with high income and children and retired people with high income are those who spend the most on organic food products. This evolution is supported by the Walloon government through the organic farming development plan.

Keywords: *organic products, food consumption, Belgium, evolution*.

THE EFFECT OF APPLYING A TARGETED POLICY FOR DEVELOPMENT OF ORGANIC FARMING IN BULGARIA

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Abstract

Organic farming is an important priority for agriculture policy in Bulgaria and one of the key components of the Common Agricultural Policy (CAP) for the period 2014-2020. Encouraging farmers to switch to or to maintain organic farming contributes to both: (a) conservation environment – strengthening agro-ecosystems, protect biodiversity and enable future generations to benefit from the preserved nature; (b) production of healthy food – this form of agriculture meets the needs of the growing number of users because it uses safe and transparent methods of production; (c) social impact – creating rural employment and more jobs compared to conventional agriculture. In recent years, the awareness of consumers about the qualities of food products they consume and for the environmental protection is increasing. This leads to increased demand for organic products. The growing demand for organic agricultural production requires the introduction of specific policy measures to support and facilitate organic farming. The main objective of the paper is to analyze the overall impact of the implementation of policy measures targeted to stimulate organic production in Bulgaria in last ten years.

Keywords: *organic farming, Policy measures, CAP, Bulgaria*

ORGANIZATIONAL FORMS OF ORGANIC FARMS IN POLAND

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Abstract

Organic farms form a perspective segment of the Polish agriculture, which have been developing very dynamically since Poland accession to the European Union (from 2004). Changes in the population of these agricultural holdings` group are the result of the growing demand for organic agricultural products, the growing environmental awareness of society, as well as current agricultural policy focused on agrienvironmental practices, for which farmers are remunerated in the form of subsidies. Organic production methods include good soil condition maintenance, plant nutritious needs and animal welfare requirements. Organic farms may be differently organised. There are three basic forms of organic farms organization, namely: farms that are in transition to organic production system (are implementing environmental practices in stages); farms that combine organic and conventional production system; farms organized solely according to the organic principles. Legal requirements strictly specify what features an organic farm should have, in each of the identified organisational forms. The aim of the article is to compare organizational forms of organic farms in Poland in terms of production and economic efficiency. There were analyzed organic farms in comparison to conventional farms included in Farm Accountancy Data Network 2015. The research were conducted on the basis of indicators analysis, considering calculation reflected costs, production, economics and subsidy value connected with the Common Agricultural Policy directed to farms.

Keywords: *organic farms, organizational forms, economic analysis, Farm Accountancy Data Network, Poland*

FERTILITY PARAMETERS REFORMATION OF SOD-PODZOLIC SOILS IN THE URAL REGION AS INFLUENCED BY FERTILIZERS APPLICATION AND LANDSCAPER TYPES

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Abstract

The effect of geochemical state of the moraine-erosion landscape, caused by the relief, and fertilization on agrophysical and agrochemical parameters of sod-podzolic heavy loam soil and spring wheat yield was studied in a stationary experiment in the Ural Region. Fertilizers application was studied on three landscape types: eluvial, transit and accumulative. In the control treatments (no fertilizers: organic or mineral) degradation processes in sod-podzolic soils and irrational use of arable land as a result, were evident. That was confirmed by deterioration of soil fertility parameters, hydrolytic acidity raising for 0.2-0.3 mmol/100 g of soil, total exchange bases (S) decline. Microbiological soil activity decreased by 8.2-8.8%, humus content in arable layer- by 0.14%, labile forms of phosphorus and potassium - by 19-26 mg /1000 g. Degradation processes were mostly developed in the transit landscape. Stabilization of soil fertility at the initial level was provided by farmyard manure application in rate 60 t ha^{-1} combined with the use of mineral fertilizers $N_{60}P_{60}K_{60}$. The close inverse correlation (r=-0,85) between humus content and soil density was determined. Accumulation of mobile phosphorus, exchange potassium and mineral nitrogen is observed down the slope towards accumulative landscapes and reaches the maximum values in the inter-hill depression (accumulative landscape). The influence of the geochemical state and landscape heterogeneity, caused by relief, was more important for agrophysical and agrochemical properties of the soil compared with fertilizers application. The accumulative landscape is characterized by favorable soil conditions, in transit landscape the worst fertility parameters were noted.

Key-words: *agromicrolandscape, sod-podzolic soil, mineral fertilizers, farmyard manure, humus, soil density, spring wheat, soil acidity, labile phosphorus, exchange potassium.*

STUDY OF THE AFFECTED CONSERVATION AGRICULTURE ON AGRICULTURAL POTENTIAL OF THE LAND AND THE ENVIRONMENT: THE CASE OF TISSEMSILT (ALGERIA)

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Abstract

In the town of Tissemsilt, the techniques of mechanized tillage have shown their limits for sustainable management of soil resources for two reasons: the insufficient matrix of erosion and loss of soil organic matter stocks. In other words, these techniques have not been adapted to the pedological and climatic constraints of our study area. Mechanized tillage techniques have resulted in excessive fragmentation, soil compaction, erosion, runoff, impoverishment and drying lands and do not allow sustainable agricultural development. There is a twofold challenge: the culture system should permit amelioration and at the same time the preservation of natural resources in the soil and the environment. This challenge cannot be completely met unless the no-tillage system is carried out at a high technological level. This technological development must refer to the management of harvesting residues and at seedling time, crops implantation, fertilization of fundus and the weeding practices (type of herbicide, its dose and application). This technological development of cropschess in relation to the edaphic conditions. Direct seeding preserves the environment by reducing the loss of soil and nutrient elements and practice the treatment products for the improvement the quality of water and air. The no-tillage system is a privileged way to combat water erosion and wind. In point of fact the cover by crops residues control the losses in water by runoff and by wind.

Key words: *soil, degradation, town of Tissemsilt, agricultural development*

GROWTH AND PHOSPHORUS UPTAKE OF MAIZE (*ZEA MAYS*) INFLUENCED BY COVER CROPS AND ALTERNATIVE PHOSPHORUS FERTILIZERS (APFs)

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Abstract

This study was conducted to investigate the enhancing ability of cover crops to P-availability of alternative phosphorus fertilizers in differing soil conditions by quantifying their effects on maize growth and P-uptake traits. Three cover crops (CC), including buckwheat (*Fagopyrum esculentum*), red clover (*Trifolium pratense*) and phacelia (*Phacelia tanacetifolia*), and three phosphate fertilizers (PF), including rock phosphate, ash from sewage sludge and digestate, were utilized in a greenhouse pot experiment with maize as the main crop. The treatments were arranged in a randomized complete block design (RCBD). Plant-available soil P was quantified by P_{CAL} and plant P was analysed by acid digestion. The data were subjected to ANOVA using SPSS to determine significant difference among the main factors (soil, CC and PF) as well as their interactions. Growth and P uptake of maize were least under Buckwheat treatment while no significant differences were found between the control, red clover and phacelia. This can be attributed to the lower shoot P-concentration as well as the wider C/P ratio of buckwheat residues, which favours P immobilization rather than mineralization. A slight impact of the soil and PF were observed on the shoot P concentration and the C/P ratio of maize. No significant interaction between the main factors during the period of maize growing was found in this study. No clear enhancing effect of CC on P from PF was detected, hence further research is recommended.

Key words: *cover crops, alternative phosphorus fertilizers, plant available soil P, growth and P uptake of maize, enhancing effect.*

INFLUENCE OF ORGANIC FERTILIZATION ON THE BIOCHEMICAL COMPOSITION OF FRESH AND DRIED FRUITS OF JAPANESE QUINCE (CHAENOMELES SP.)

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Abstract

The experiment was conducted in 2014 in the experimental plantations of Japanese quince at RIMSA in Troyan, Bulgaria. The influence of the organic fertilizer Tekamin Brix (in two concentrations 0.2% and 0.3%) and manure on the biochemical composition of fresh and dried fruits of Japanese quince was studied. NH_4NO_3 was used as standard. The results showed a positive effect on the amount of total and invert sugar in both fresh and dried fruits after fertilization with Tekamine Brix.

Keywords: *Japanese quince (Chaenomeles sp.), Fresh fruit, Dry fruit, Bio chemical compounds, Organic fertilizers.*

EFFECT OF BIOFERTILIZER AND COMPOST LEVEL ON NITRATE CONCENTRATIONS, YIELD AND QUALITY OF POTATO TUBER UNDER NEWLY RECLAIMED SANDY SOIL CONDITION IN EGYPT

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Abstract

This investigation was carried out during the two summer seasons of 2015 and 2016 in sandy soil on potato culitvar "Sante" to study the effect of using 100% compost (15 t/fed.) and 50% compost + nitrogen fixing bacteria (*Azotobacter*, and *Pseudomonas* alone or together) on potato yield and quality as compared to the conventional mineral fertilization (120-75-150 kg/fed. NPK + 5 ton compost/fed. (control)). No significant differences in tubers yield/fed. were detected between mineral fertilization (control) and using 100% compost (15 t/fed). However, control treatment significantly produced a high yield per feddan, more than using 50% compost + any biofertilizer treatment. Using compost treatment at 15 t/fed. exceeed all biofertilizer treatments in marketable yield in both seasons, but without significant differences as compared with mineral fertilization (control). No significant differences in tuber dray matter and content of starch in tuber were found between using compost treatment at 15 ton/fed. and mineral fertilization treatment (control) in both seasons. Nevertheless, application of 50% compost+ 4 applications of Azotobacter and Pseudomonas had the highest tuber concentrations of starch and nitrogen with significant differences as compared with the mineral fertilization. Using 50% compost + 4 applications of Azotobacter or Pseudomonas or both (Azotobacter + Pseudomonas) and application of 100% compost caused producing potato tubers with the lowest concentration of nitrate with significant differences as compared with the mineral fertilization. No significant differences were detected between mineral and organic fertilizers concerning P and K concentrations in tubers.

Keywords: *Potato, Compost, Azotobacter, Pseudomonas, Biofertilizer.*

EFFECTS OF COMPOST AND MINERAL SULFUR FERTILIZERS ON PHOSPHORUS DESORPTION ON THE WUJIRABA WATERSHED, NORTH-WESTERN HIGHLANDS OF ETHIOPIA

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Abstract

Phosphorus (P) fixation, responsible for low availability of P, is one of the major problems of crop production on acidic soils such as Nitisols. It is one of the most chronic problems for crop yield decline on the Wujiraba watershed. An incubation study was conducted in 2013 for two months to investigate the effects of compost and sulfur (S) fertilizers on P desorption in strongly acid soils (pH/KCl 4.53) and soils with low P content (Bray II P 4.8 ppm). After air drying, grinding and passing through 2 mm sieve, 200 gm of composite soil was placed to each pot. The treatments included three rates of compost (0, 5 and 10 t ha-1) and S (0, 15 and 30 kg ha-1) fertilizers which were laid out in CRD, using three replications. At the end of the incubation period, the analysis revealed that there was a highly significant ($P \leq 0.001$) difference in available P by the interaction effects of compost and S fertilizers. The highest (22.8 ppm) available P was recorded in the pots treated with a high dose of compost (10 t ha-1) and nil S fertilizer rates which increased by 301% relative to the control. Unlike the compost, the S fertilizer resulted in a decrease in pH and available P but an increase in exchangeable acidity (Ac) and aluminum (Al) contents of the soil. This study showed a decline in P fixation and exchangeable Al when the compost was applied; and an increase when S fertilizers were applied. Therefore, applying compost is a cost effective measure on strongly acid soils that can benefit farmers while S fertilizer aggravates soil acidity and P fixation problems on Nitisols.

Key words: *Acidic soil, incubation study, Nitisols, P availability, P fixation, yield decline*

EFFECTS OF ORGANIC AND INORGANIC FERTILIZERS ON YIELD AND YIELD COMPONENTS OF MAIZE ON THE WUJIRABA WATERSHED, NORTH-WESTERN HIGHLANDS OF ETHIOPIA

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Abstract

Maize (Zea mays L.) is one of the most important staple food crops in Ethiopia and other African countries although its yields are low. Over-cultivation causes plant nutrient depletion and yield decline. The objective of this experiment was, therefore, to investigate the effects of the integrated application of organic and inorganic fertilizers on yield and yield components and nutrient contents of maize. Field experiments were conducted on Nitisols for two consecutive cropping seasons on the Wujiraba watershed, in the north-western highlands of Ethiopia. The experiments were laid out in RCBD as a factorial combination of three levels of N (0, 60 and 120 kg N ha^{-1}), compost (0, 5 and 10 t compost ha^{-1}) and S (0, 15 and 30 kg S ha^{-1}), which were replicated three times. In this experiment, significant ($P \leq 0.05$) differences were observed in maize grain yield, total above ground dry biomass, plant height, grain number per cob, cob weight, thousand seed weight, N and S contents of leaves and grains by such fertilizers combination. The highest mean grain yield, dry biomass, plant height, grain number per cob, cob weight, thousand seed weight, N content in leaf and grain (7.9 t ha^{-1}, 22.4 t ha^{-1}, 2.52 m, 486, 0.44 gm, 492 gm, 3.25 and 1.4%) were observed in plots treated with fertilizer combinations of 120 kg N ha^{-1}, 10 t compost $ha^{-1}$and 15 kg S ha^{-1}, respectively. From this study, it is possible to infer that the integrated application of organic and inorganic fertilizers increased crop yields. Hence, the incorporation of compost with inorganic fertilizers at 120 kg N ha^{-1}, 10 t compost $ha^{-1}$and 15 kg S ha^{-1} is the optimum and it could be recommended for maize as it enhances grain yields and yield components of maize on nutrient depleted soils.

Key words: *Integrated application, intensive cultivation, Nitisols, nutrient depletion, staple food, yield decline*

FERTILITY STATUS OF SOIL IN DIFFERENT SYSTEMS OF LAND USE ON THE WUJIRABA WATERSHED, NORTH-WESTERN HIGHLANDS OF ETHIOPIA

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Abstract

On the Wujiraba watershed, changes in land use, mainly from natural vegetation to cultivated lands, have brought rapid depletion of plant nutrients. The present study, therefore, was designed to investigate the effects of different systems of land use on the soil fertility status of Nitisols on the Wujiraba watershed. Twenty-seven soil samples were collected depth wise (0 - 15, 15 - 30 and 30 - 45 cm) from cultivated, forest and grazing lands based on their stratification. The data were analyzed using descriptive statistics. Land use and soil depth showed variations in soil physicochemical properties. The maximum total porosity (57.8%), pH (5.03), OC (4.6%), total N (0.28%), available S (11.1 ppm), CEC (42.2 $cmol_c\ kg^{-1}$), soil exchangeable bases (Ca (22.2), K (0.76) and Na (0.58 $cmol_c\ kg^{-1}$)) and extractable micronutrients ((Fe (14.2) and Mn (24.1 ppm)) were observed on the surface layers of forest land, while the minimum values were recorded for the cultivated land, although relatively higher available P (5.5 ppm) was observed on the surface layers of the cultivated land. The results revealed that soil fertility declined as land use shifted from forest to grazing and cultivated lands. Hence, it is possible to infer that forest land was rich in plant nutrients while over cultivation depleted them, which urges us to take important measures to preserve the remnants of forests and maintain the fertility status of the cultivated soils in this area.

Key words: *Cultivated land, forest land, grazing land, plant nutrient depletion, soil fertility*

EFFECTS OF ORGANIC AND INORGANIC FERTILIZERS ON THE SELECTED SOIL PROPERTIES AFTER MAIZE HARVEST ON THE WUJIRABA WATERSHED, NORTH-WESTERN HIGHLANDS OF ETHIOPIA

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Abstract

Soils in Ethiopian highlands have low levels of plant nutrients due to erosion and leaching that are associated with high amounts of rainfall. One of the major constraints for crop production is improper nutrient management. Therefore, the objective of this study was to evaluate the effects of organic and inorganic fertilizers on the soil fertility of Nitisols on the Wujiraba watershed. The study was conducted for two consecutive years using maize variety BH-540 as a test crop in rain-fed conditions. Soil samplings were undertaken twice: before planting and two years after harvesting maize. The experimental treatments included factorial combinations of three rates of N (0, 60 and 120 kg N ha^{-1}), compost (0, 5 and 10 t compost ha^{-1}) and S (0, 15 and 30 kg S ha^{-1}) fertilizers, which were laid out in RCBD with three replications. In comparison to the initial soil, the results showed that the integrated application of organic and inorganic fertilizers improved soil total porosity, pH, OC, total N, CEC, available P and S by 31.8, 0.9, 58.1, 20.0, 3.1, 29.8 and 38.9%, respectively but decreased bulk density by 26.1% in 0 - 30 cm soil depth. The plots treated with 10 t compost and 30 kg S ha^{-1} had the lowest bulk density and the highest total porosity, while the combined application of 120 kg N, 10 t compost and 30 kg S ha^{-1} showed the highest total N, available P and S. The highest OC and CEC were recorded in the plots treated with 60 kg N and 10 t compost ha^{-1}. Generally, the integrated application of organic and inorganic fertilizers improved plant nutrients and soil fertility. It is possible to conclude from this study that the incorporation of compost with inorganic fertilizers for maize improves plant nutrients, which is important for small-scale farmers in this area.

Key words: *Initial soil, integrated nutrient management, leaching, Nitisols, plant nutrients, two years after harvesting*

CONCEPT INTEGRATION OF ORGANIC FARMING, MICROBIAL INNOVATION AND VERMITECH APPROACH TO SUSTAINABLE AGRICULTURE

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Abstract

Organic farming is an important concept towards sustainable development that involves the use of organic input for the production of crops. Biofertilizers like vermicompost and vermiwash increase the organic matter content necessary for the maintenance of soil properties, which is beneficial for long-term sustainability and crop productivity. Biofertilizers are enriched with micronutrients and beneficial microbes that enhance the soil quality and aid in slow release of nutrients required for the healthy growth of plants. Various small and large scale experiments on field crops like wheat, sugarcane, paddy along with vegetables like tomato, okra and eggplant have been successful in terms of productivity and quality of produce. These technologies have also been adopted successfully by food growers across the globe resulting in substantial markets for organic produce.

Keywords: *Biofertilizer, Vermicompost, Vermiwash, Soil improvement, Crop productivity.*

TRENDS IN THE USE OF RABBIT URINE AS A FOLIAR FED ORGANIC FERTILIZER TO ENHANCE CROP PRODUCTIVITY, FOOD SECURITY AND SOIL PH AMMENDMENT

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Abstract

The study was carried out in Bishop Muge Kapsabet College - Nandi Central District – Nandi County Kenya. The objectives were to establish the nutritional value of rabbit urine and its effects on biomass yield on green leaf desmodium, oats and spinach crops. All the crops were planted by drilling in plots measuring 2 by 2 meters with each treatment replicated 3 times where the respective treatments were applied every fortnight. Rabbit urine was collected using a gutter. Samples measuring 50mls of each treatment were collected and taken to National Agricultural Research Laboratories to determine the nutritive value and PH. There was one control treatment of crops unfertilized. The nutrient composition for NPK levels for all the treatments was same i.e. Nitrogen% and Phosphorus% was 0.70 and 0.02 respectively and potassium and calcium levels for 100% urine was 0.85 and 0.12 respectively, while magnesium levels were the same at an average of 0.57%. The results showed that 50% urine had a PH of 8.0 while 100% had a basic PH of 8.5 and the commercial fertilizer (FC) had an acidic PH of 5.0. At the end of six weeks, all the crops were cut and weighed using a digital scale and biomass yield of each recorded. The results indicated that crops fertilized with 50% urine had significant ($P<0.05$) difference in biomass yield and also the crops showed extra-ordinary greening effect of foliage, early flowering and early tasseling as compared to the rest. This can be attributed to the high nitrogen levels in the 50% concentration and may also be due to the presence of Tam-Horsfall glycoprotein in rabbit urine which provides extra energy and proteins for faster plant growth and biomass yield. It was concluded that rabbit urine at 50% concentration is the most effective level for use as organic foliar feed fertilizer.

Keywords: *Rabbit urine - Nutrient composition, Organic fertilizer, Biomass yield, PH.*

ORGANIC FARMING DEVELOPMENT IN LATVIA: SUPPORTING INNOVATIVE INITIATIVES

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Abstract

Organic farming as more sustainable agricultural production system shows considerable growth on the global and EU level, including Latvia. It has been widely argued by scholars and politicians that the sustainable and environment friendly farming can provide economic rural development benefits through enhanced entrepreneur activities and growth of jobs. Besides, organic farming generates environmental and social (i.e. health) benefits for society and among others provide various ecosystem services (e.g. food, recreation and tourism). The paper discusses the issues and prospects of organic farming and related activities' development in Latvia. The hypothesis of study is that short or local food chains are a suitable tool for further development of organic farming, as well as rural areas and society. The aim of the paper is twofold: 1) to assess the latest development trends and issues of whole organic farming sector, as well as its spatial aspects; 2) to evaluate the role and impact of short or local food chains on the further development of the sector. The sustainability initiatives of organic farmers that in many cases have economically, environmentally and socially innovative character are identified. The role of mutual interaction and impact among the organic farmers' per se, various stakeholders and consumers for creation of short or local food supply chains are evaluated. Special attention is paid to the different types of cooperation forms and networks as well as collaboration with rural tourism providers. The results show that various cooperation and collaboration forms and networks support distribution channels of organic food and increase supply of processed food, mainly home-made and artisan. Accordingly, these activities boost the added value and consequentially organic farmers' income.

Keywords: *Organic farming, short food chain, rural, Latvia.*

SILICIOUS LIGNIN APPLICATION FOR THE BIOLOGICAL FARMING PRACTICE OF BUCKWHEAT

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Abstract

LSi, considered as biomimetic of soil organic matter-clay mineral complex. The application rate of LSi tested was varied from hundreds kg per ha to 10 kg. Naturally, that low dosages of soil amendments are more economically favorable. The aim of the present work was evaluation of possibility for further decreasing of the Si-L application rate using buckwheat as test object. Homemade adjustment coupled with seed box of swing machine was used to provide homogenization of LSi-seeds mixture. The experiments with lowered application rates of LSi (1.8 and 4 kg per ha) were performed on the fields of "Kelmeni" farm in conditions accepted for biological farming. It was shown that in comparison with control the yield of buckwheat increased twice or 2.5 times and is equal 0.53 t per ha (control); 1.08 t per ha (1.8 kg LSi per ha) and 1.3 t per ha (3.2 kg LSi per ha). The grain quality content of rutin, including amino acid composition and other characteristics is close to that one obtained on the background of LSi application in the rate of 10 t per ha. When the buckwheat was grown on the background of lowered LSi dosage decreasing the amount of weeds on the fields was marked. Efficiency of lowering dosages of LSi applications decreasing amount of weeds together with confirmation of enhanced yields and quality of buckwheat grain are the basis for usage of LSi in farming practice.

Keywords: *Silicious lignin (LSi)/lignocellulose, buckwheat*.

UTILIZATION OF NEEM (*AZADIRACHTA INDICA*) TO ENHANCE NEMATICIDAL EFFICACY OF COW-DUNG IN THE CONTROL OF LESION NEMATODE (*PRATYLENCHUS ZEAE*) INFECTING MAIZE (*ZEA MAYS*) IN NORTH-EASTERN NIGERIA

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Abstract

The field experiments were conducted in 2014 and repeated in 2015 at the Research Farm of the University of Maiduguri to test nematicidal efficacy of cow dung and neem in the control of root lesion nematodes (*Pratylenchus* spp.) on maize. The aim of this study was to evaluate the efficacy of neem and cow dung applied singly and in combination to suppress the population of *Pratylenchus* spp infecting maize. The processed crude neem and cow dung were applied singly and in combination to 2 m x 2 m size plots using a method of spot application at the rate of 160 g, 2400 g and 2800 g, respectively. A chemical nematicide Furadan was applied at 16.0 g per plot as a standard for comparison. Unamended plots served as control. The result showed that the plots treated with mixture of neem and cow dung had the lowest nematode population (23.3). This is followed by neem and cow dung applied singly (populations of 98.3 and 30.7, respectively). The control plots produced the highest nematodes population (270.7), significantly (P = 0.05) higher than in all other treatments. The highest maize yield (556.7 kg) was produced by the mixture of neem and cow dung, which is significantly (P = 0.05) different from in all other treatments. The yields produced by neem and cow dung were 269.3 kg and 224.5 kg respectively, compared to Furadan whose yield was407.8 kg. The unamended plots produced the lowest yield (72.3 kg). Growth parameters followed the similar trend as yield. From the results obtained in this study, it could be recommended that the use of ammonia-releasing organic amendments, such as cow dung mixed with neem extracts or other nitrification inhibitors, could make nematode control more practicable by reducing the amount of organic amendments needed to control nematode populations and so it could be adopted by farmers.

Key words: *Alternative control; organic farming, sustainable management.*

NEMATICIDAL EFFECT OF NEEM AND POULTRY MANURE ON ROOT KNOT NEMATODES (*MELOIDOGYNE* SPP.) INFECTING OKRA (*ABELMOSCHUS ESCULENTUM*)

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Abstract

The field experiment was conducted in the summer of 2014 and repeated in 2015 to determine the effect of neem kernel powder and poultry manure applied singly and in combination for the control of root-knot nematode infecting okra. Different treatments were assigned to 2m x 2m plots; and the non-amended plot served as a control. Sixteen stands were created and planted with okra seeds. The experiment was laid out in a randomized complete block design (RCBD) with three replications and five treatments. The collected data were analyzed with ANOVA and the means were significantly separated using Fisher's least significant difference. The result of the study showed that all the treatment significantly ($P < 0.005$) reduced nematode population parameters and improved okra growth and yield. Although all the treatment were effective in reducing the nematodes, poultry manure applied singly and in combination with poultry manure both gave the lowest reproductive factor [RF] of 1.7 and 1.8, respectively, compared to the non-amended (control) treatment that gave the highest RF of 3.5. The combination of neem and poultry manure gave the highest okra yield of 3.0 kg followed by neem and poultry manure applied singly that gave okra yield of 0.4 kg and 0.5 kg, respectively. The practice of mixing neem powder with animal manure to get a sustainable control method could help immensely in the suppression of nematode populations, which could lead to increase in farm productivity (yield/hectare). Further research is needed to identify precisely the active ingredients responsible for causing the suppression of nematode populations and to find the appropriate way to combine them in order to enhance the control of nematode populations .

Key words: *Alternative pest management, nematodes, organic agriculture, sustainability.*

FACTORS INFLUENCING USAGE OF ORGANIC FERTILIZER FOR VEGETABLE PRODUCTION BY FARMERS IN KWARA STATE, NIGERIA

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Abstract

Vegetable refers to the fresh edible portion of herbaceous plant roots which are not only consumed, but also support rural and urban population both in terms of subsistence and income generation. Its cultivation however presents with problems which limits the optimum yield and this can be reduced with the use of organic fertilizers. Therefore, there is a need to assess the use of organic fertilizer among vegetable growers as it directly affect yield of vegetables. This study was conducted in Asa Local Government Area of Kwara State. Purposive and simple random sampling was used to derive 120 respondents who were interviewed. Results from the study showed that the majority of the respondents were old as about 94% were above 25 years while 77% of the farmers are females. A few (19%) of the sample had up to secondary education while many (50%) lack formal education. A large proportion (86%) of the sample used organic fertilizer on their farms and 72% used a combination of poultry droppings and cow dung to fertilize their farms on a regular basis (fortnightly). Offensive odour and transportation problems were among the prominent limitations to the use of organic fertilizer among the sample. The study concludes that although vegetable farmers in the study area profusely use organic fertilizer, the yield is rather poor. It was therefore recommended that application should be supervised by relevant agencies to ensure correct levels of usage whilst research institutes needed to devise means of reducing offensive smells of organic fertilizers.

Keywords: *Amaranthus, Poultry-droppings, Cow-dung, Odour, Yield.*

PLANT GROWTH PROMOTING RHIZOBACTERIA (PGPR): DIVERSITY AND AGRO-BIOTECHNOLOGY (AN OVERVIEW)

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Abstract

PGPR microbes are microorganisms that naturally occur in soil or are associated with plant roots and play an important role in agricultural systems, especially as bio-fertilizer, phytostimulators and biocontrol agents. Solubilizing phosphates can exert their beneficial roles to plants by fixing nitrogen, solubilizing phosphates, producing of siderophores and phytohormones, as well as suppressing plant pathogens. The most reported PGPR genera are *Pseudomonas, Azospirillum, Bacillus, Azotobacter, and Burkholdaria*. In this review will list all studied and documented plant growth promoting rhizobacteria (PGPR) and discuss their microbial diversity and latest phylogenetic affiliation and classification, especially focusing on the most frequent and reported genera. Furthermore we will recapitulate their beneficial activities and mechanisms involved in plant growth stimulation and plant disease incidence reduction.

Key words: *diversity, beneficial activities, mechanisms, plant growth, agro-biotechnology.*

MIXTURES SUITABLE FOR ORGANIC TOMATO SEEDLINGS PRODUCTION

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Abstract

One of the main tasks for successful organic tomato (*Solanum lycopersicum* L.) production is to grow healthy and well-developed seedlings. To achieve this task, beside certified organic seeds, an appropriate substrate is needed. Unfortunately, there is a lack of inputs suitable for certified organic production on the market (seeds, fertilizers and substrates for vegetable nurseries). The aims of this study were to evaluate different substrates designed for the production of organic tomato seedlings and to check the possibility of peat substitution with renewable materials. The trial was performed at the experimental glasshouse of the Institute of vegetable crops in Smederevska Palanka (Serbia). Natural peat, vermicompost, shrub and tree leaf compost and zeolites were used for substrate preparation. Eight substrate mixtures were compared with usually used commercial substrates. The early maturing tomato hybrid Balkan F1 was grown in pots with 11 cm diameter. Plant height, plant mass, the number of leaves per plant, the percentage of plants with flowers and fruits were measured. Compared to the commercial substrates, for the majority of mixed substrates, the differences in examined traits were not significant. However, mixtures with zeolites showed better results than the others. Three mixed substrates with high rates of vermicompost and organic compost should be highly recommended for organic producers.

Keywords: *Nursery*, *Waste management*, *Seedlings.*

ALTERNATIVE CROPS AND ECOLOGICAL PLANT BREEDING AS A FUNCTION OF ORGANIC AGRICULTURE

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Abstract

It is widely understood that agricultural production is based on the exploitation of natural, primarily biological, chemical and physical resources. Thus, the soil (lithosphere) represents the physical source, i.e. the foundation for cultivation of cereals, field crops, fruit, and vine growing. Furthermore, it represents the chemical source supplying the crops with an adequate amount of both major and trace elements and other nutrients. In this paper the following alternative crops interesting to be cultivated in Balkan countries in order to enlarge the biodiversity are discussed: broomcorn, grain sorghum, proso millet, canarygrass, buckwheat, oil pumpkin, hemp, flax, tobacco, medicinal, aromatic and spice species as well as amaranth. The production of the majority of alternative crops requires a high amount of hand labour, but it is a way to obtain higher profit from the unit of land area as compared to conventional field crops. The diversity of this type of production, which is inherently evident in the obligatory wide crop rotation, the cultivation of intermediate crops, cover crops, green manure crops, and useful bioactive plants and predators, along with the selection of resilient, primarily autochthonous sorts and races, makes organic farming dependent upon the state of biodiversity. At the same time, multi-functional organic farming contributes to the conservation of genetic resources and ecosystem diversity, and its job opening and profit increasing potential creates the foundation for a better quality of life in rural areas. Long time organic breeding, seed reproduction and sales initiatives have been successfully established in Serbia. Such organic institutions require long term engagement and support.

Keywords: *Alternative crops, Agrobiodiversity, Organic breeding, Genetic resources.*

LOW COST ORGANIC COMPOST FOR UPLAND RICE PRODUCTION IN UPLAND AREA OF ETHNIC MINORITY FARMER'S FIELD

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Abstract

This research aimed to evaluate the effect of the application of an inexpensive and simple to make organic compost produced by the ethnic minority farmers (Pa-gha-ker-yer) at Baan Pala-u, Huay Sat Yai, Hua Hin District, Prachuap Khiri Khan Province, Thailand in cultivating upland rice. This research had been conducted in the farmer's rice field in the Pala-u forest (12° 51′N and 99° 49′E), Thailand during the rainy season (July to November 2015). The factorial in completely randomized design (CRD) with four replications was used in this study. After the application of this simple organic compost to 16 varieties of the upland rice, the agronomic characteristics, such as tiller number, 100 seed weight and yield, were determined compared to the nil control. The result showed that application of the simple organic compost, which is a product of the mixture of soil under bamboo canopy and rice straw, had increased yield of these 16 upland rice varieties. However, the effect of the application of this simple organic compost to increased yield among these rice varieties was varied. Rice varieties had a higher yield and responded to the application of organic compost included var. Beu Ge, Poo Nge, Beu Gaw Bi, Gi Poo, Nah San and Aung Jerng Yai.

Keywords: *Low cost compost, Bamboo soil, Rice straw, Organic fertilizer, Upland rice.*

EFFECTS OF DIFFERENT MEDIA ON THE QUALITY OF ORGANIC FIG NURSERY TREES GROWING

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Abstract

This project is planned in order to produce the nursery trees in accordance with the principles of organic agriculture and consequently to produce "organic fig nursery trees", which is a strategic product for our country. The main aim of the study was to produce an "organic fig nursery trees" with growing techniques based on the use of domestic resources as input. In the substrate culture, Sarılop and Bursa Siyahı fig cultivars and trough culture system, which is one of the soilless culture systems, agregates such as peat, perlite and clinoptilolite which are allowed to use in organic agriculture as well as mediums such as chestnut shell, peanut shell, and as a control, the nursery seedlings were produced using the materials used in different proportions in the soil as material in the experiment. The plant material was *Ficuscarica* L. cv. "Sarılop" (Calimyrna) and Bursa Siyahı. Six different growth media based on %100 chestnut shell, %100 peanut shell, %50 peat+ %50 perlite, %50 peat + %50 klinoptilolit, 1/3 soil+1/3 peat+1/3 sand (compost) were tested using soil as a control. When the results obtained from the aspect of the quality of nursery trees on the basis of varieties were evaluated in general in the medium experiment carried out in 2013, it was determined that the substarate of Peat (50%) + clinoptilolite (50%) was the rooting medium when the rooting rates for Bursa Siyahı fig variety were taken into consideration.Rooting rates obtained from the control (soil), Chestnut shell (100%) and conventional trial media gave similarly successful results; For Sarılop fig cultivars, among the media where the most rooting occurs; Peat (50%) + Clinoptilolite (50%) and Peat (50%) + Perlite (50%) as well as the compost material (1/3 soil, 1/3 Peat, 1/3 sand) were determined.It was concluded that the use of peat+perlite, chestnut shell and compost led to increased plant growth and quality of fig nursery trees.

Key words: *Media, quality, organic fig.*

DETERMINATION OF VERMICOMPOST AND AMMONIUM NITRATE APPLICATIONS EFFECTIVENESS ON BROCCOLI WITH SOIL AND LEAF ANALYSES

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Abstract

The aim of this study was to evaluate irrigation and fertilizer requirements of broccoli (*Brassica oleracea* L. var. *italica*) in Tekirdağ region. For this purpose, using fertigation techniques, growing possibilities of broccoli and the effects of soil and plant to fertilizer concentrations have been established and compared with applied fertilizer rates and irrigation water volumes. Field trials were conducted in a greenhouse during spring and autumn of 2016. Experiment was applied at two different irrigation levels and four different fertilizers with the randomized complete block experimental design and three replicates. Irrigation water ratio was, depending on the greenhouse soil moisture monitoring, as follows: the irrigation application was started when available soil moistures drops to 60%and deficit soil water was completed at 50% (I_2) and 100% (I_1). Fertilizer applications were performed as vermicompost, two different doses of liquid worm-fertilizer and ammonium nitrate. Generally, the effects of irrigation and fertilizer amounts on yield and macro and micro nutrient content of plant and soil were statistically significant. The greatest broccoli yield was obtained in the spring period from I_1G_4 treatment as 1665 kg $da^{-1}$and in the autumn period yield did not obtained. It was observed that fertilizer activity increased with irrigation practicesand chemical fertilizer applications contributed to yield.Also, vermicompost applications were shown to contribute to soil in respect of soil and leaf nutrients.

Key Words: *Broccoli, vermicompost, fertigation, organic fertilizer, chemical fertilizer*

IMPACT OF SPECIAL HERBAL PREPARATION ON YIELD OF CABBAGE AND LETTUCE ON SANDY SOILS

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Abstract

The paper describes testing the impact of a special herbal preparation (SHP), in the capacity of a plant growth regulator (PGR) and a mild organo-mineral fertilizer, on yield of cabbage and lettuce. Field experiment was carried in two greenhouses situated at the location Gadid in Gaza Strip, under specific site conditions - sandy soil, low organic matter content, increased concentration of salts in irrigation water. SHP was based on herbal extracts from comfrey, dandelion, horsetail, lavender, nettle, yarrow and wormwood, enriched with major macronutrients and essential micronutrients. The production trial was executed as per following conditions. There were four treatments (T_i): T1 - SHP, standard rate, T2 - SHP double rate, T3 - SHP, standard rate + NPK (25 % of commercial rate), T4 - NPK (25 % of commercial rate) and control group - NPK, commercial rate. Planting density of cabbage was 6,500 plants/dunam (1000 m^2) and that of lettuce – 7,800 plants/dunam. Experiment layout was the random block system with four replications (blocks). The achieved results had shown that it is possible to produce cabbage and lettuce on sandy soils using SHP enriched with low mineral inputs. Also, it is obvious that applied commercial production of cabbage and lettuce on sandy soils was based on the huge input of fertilizers.

Key words: *special herbal preparation, cabbage, lettuce, sandy soils, yield*

EVALUATION OF GENETIC POTENTIAL FOR ENVIRONMENTAL PLASTICITY OF MALTING BARLEY BREEDING LINES

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Abstract

Climate changes impose different environmental stress, which limits plant's growth and development, the formation of yield and quality of production. Lack of sufficient moisture and lower temperature during the crops vegetation are more challenging and requires the establishment of stress-tolerant varieties with high quality and yield. Evaluation in field condition of the reaction to different abiotic stress factors is sometimes difficult due to the lack of such. Therefore, application of reliable laboratory methods for quick screening of a large amount of breeding materials on these indicators is necessary. The cold and drought resistance of 15 high yielding two-row barley breeding lines has been investigated in laboratory conditions. The laboratory trials have been conducted in Agricultural University of Plovdiv, Bulgaria by express methods of Bozhanova (1997) and Bates (1973). The evaluation of shoot and root response to osmotic stress and low temperatures as well as the accumulation of free proline in stressed young plants allows the identification of the most adaptive genotypes to unfavorable abiotic factors. The stress reaction of breeding lines 5, 13 and 45 defines them as the most cold resistant and drought tolerant, and therefore suitable germplasm in new breeding programs of winter barley.

Keywords: *Cold resistance, Drought tolerance, Malting barley, Osmotic stress, Plant breeding*.

WINTER GREENHOUSE VEGETABLE PRODUCTION ENHANCED BY THE BROWN SEAWEED EXTRACTS

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Abstract

Owing to the content of hormones, vitamins and enzymes, brown algae extract, *Ascophyllum nodosum* L. (ANE) has plant growth promoting effect despite the small content of the major plant nutrients (N, P, K etc.). In addition, due to its natural content of physiologically active substances, ANE can alleviate the effects of stress in treated plants. This may have a particularly great importance for the winter production of vegetables in greenhouses in which the soil is usually highly saturated with nutrients. In order to determine the plant growth promoting effects of three different ANE, the experiment was conducted in the greenhouse of the Institute of vegetable crops in Smederevska Palanka, Serbia, on the vertisol soil type. The low-temperature tolerant species radish (*Raphanus sativus* var. *radicula* L.), spinach (*Spinacia olerace* L.) and garlic (*Allium sativum* L.) were sown in late autumn and treated with three different ANE. Plant height, plant mass, the number of leaves per plant and yield were measured. Comparing to untreated plants, examined traits on radish treated with ANE were not significantly different. However, ANE enhanced the plant mass and yields of spinach and onion. The application of ANE for vegetable cultivation in greenhouses during the winter can be recommended for conventional as well as for organic production systems.

Keywords: *Greenhouse cultivation, Sustainable production, Fertilizers*

SPELT AS ORANIC RAW MATREIAL FOR PRODUCTION OF EXTRUDED PRODUCTS

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Abstract

Spelt wheat (*Triticum aestivum* sub sp. *spelt*) is an old crop. That is a low input plant, sutible for growing without the use of pesticides in harsh ecological conditions and in marginal areas of cultivation. Spelt pasta is produced without additives, food colours and it doesn't contain genetically modified materials, thus meets the requirements of an organic product. Organic food can be rated from satisfactory to good, because it contains much higher levels of nutrients. Spelt wheat is suitable organic raw material for extruded products with modified nutritional characteristics. During the process of extrusion, spelt is exposed to high temperature and high pressure, during which raw material is also mechanically treated by shear forces. This paper investigates chemical and mineral characteristics of three spelt flours cultivars (Nirvana, Austria and Eco) and their influence on technological quality of spelt pasta. The significant differences between spelt flour was confirmed by application of Post-hoc Tukey's HSD test at 95% confidence limit. Calculation of standard scores (SS), based on assigning equal weight to applied parameters (chemical, mineral and technological) has been conducted and the obtained values compared. Data point at good indicators of spelt pasta technological quality with improved chemical and mineral characteristics. Pasta obtained from spelt flour may contribute to variety of organic safe products at the market.

Keywords: *Organic raw material, spelt, chemical characteristics, mineral characteristics, technological quality*

IMPACT OF DIFFERENT FERTILIZERSYSTEMS ON THE AGGREGATE COMPOSITION OFALLUVIAL-MEADOW FOREST AND MEADOW-BROWN SOIL FROM AZERBAIJAN DRY SUBTROPICS

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Abstract

Perfection of soil fertility systems under agrocenosis cultures promotes an improvement of nutrient dynamics in soil, preserves agronomically valuable soil aggregates, influences structural coefficients in arable and under arable layers of soil, and improves aggregate composition, by increasing a measure of agronomically valuable aggregates. Studies onthe impact of different fertilisation systems on the mineral part of soil definitely raise interest, particularly studies onanthropogenic factors influencing soil fertility change, as soil irrigation, cultivation, sowing of annual and perennial fodder crops. Providingfavourable physical conditions in soil allows usto create favourable situations for preservation of agronomically valuable water-stable fine-granular structure of soil. Many factors, such as water, air, biological and nutritious regimes depend on soil structure providing living conditions of higher plants and microflora. Soil conditions side by side with soil density and of the amount ofproductive moisture determine such parameters as a coefficient of structure quantity in the agronomically valuable aggregates. Microorganisms, soil particles in different forms and measures more than 0.25mm form soil aggregate compositions thatcan be examined as an object, not only reflecting results of soil-forming processes, but also the humanactivities onland. Change inthe aggregate composition and structural coefficient in alluvial meadow-forest soil under vegetable (tomato) cultures caused by different fertilizer systems showed that fertilizer organic (manure of horned cattle) systems improvedthe structural condition ofthe soil. The use of organic-mineral (manure + nitrogen, phosphorus and potassium fertilizer) fertilizers positively influencedthe structural condition ofthe alluvial meadow-forest soil under vegetable cultures, in comparison with the control variants. ITheorganic-mineral fertilizersystem (N60P90K120 + 20m/manure) also improved the aggregate composition of the soil, i.e. the importance of the agronomically valuable aggregates rose on the arable and under arable layers of soil (10-0.25mm) in comparison with the control (without fertilizer) version is accordingly till 14.1 and 9.8%. The studyallow us to establish the best index of improvement and preservation of agronomically valuable soil aggregates revealed under the version where the organic system of fertilizers was applied (40m/h of manure). Moreover, the significance of the structure coefficient on the arable and under arable layers in the soil are equal accordingly to 1.6 and 1.4.

Keywords: *soil structure, physical chemical peculiarities, nutritious regime, fertilizer, fertilizer systems.*

ALLELOPATHIC EFFECT OF SOME WEED SPECIES ON GERMINATION AND INITIAL DEVELOPMENT OF *LACTUCA SATIVA*

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Abstract

In today's "organic farming", the integrated weed management systems are increasingly being applied, including allelopathic interactions between some plant species as an alternative method of weed control. Aim of this study was to evaluate the allelopathic effect of 10 invasive weeds in forage crops (*Abutilon theophrasti, Amaranthus blitoides, Amaranthus retroflexus, Aristolochia clematitis, Cirsium arvense, Chenopodium album, Matricaria perforata, Setaria viridis, Sonchus arvensis, Sorghum halepense*) on the germination and the initial development of *Lactuca sativa* L. cultivar Great Lakes. Ex-situ experiment was carried out as follows: 20 ml (0.75%) agar were pipetted into Petri dishes and the dried weed biomass was added at concentrations 0.05, 0.1, 0.2, 0.4, 0.8% w/v. Samples were stored at 18 ± 2°C for 72 h, then 10 seeds of test plant were placed into agar. Distilled water was used as a control. Samples were placed in a thermostat-operated device at 22 ± 2°C for 5 days and the number of germinated seeds, % of germination against the control, length of the hypocotyl, radix and seedling were measured. Index of plant development (GI) was calculated for assessment of the allelopathic effect of weeds on the early seedling growth and the initial development. Most pronounced inhibition on the seed germination and GI (especially of the radix) was found for *Matricaria perforate* and *Amaranthus retroflexus* where LC_{50}=0.2-0.4% w/v and LC_{100}<0.8% w/v. Allelopathic potential of *Cirsium arvense, Setaria viridis* and *Sorghum halepense* could be defined as weak as LC_{50}=0.5-0.8% w/v and the lowest concentrations stimulated both germination and hypocotyl development.

Keywords: *allelopathy, weed management, Lactuca sativa.*

SOCIOECONOMIC CHARACTERISTICS OF RURAL AREAS OF AUTONOMOUS PROVINCE OF VOJVODINA (SERBIA)

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Abstract

Vojvodina is a rural area that is located in the northern part of the Republic of Serbia. The authors analyzed seven administrative districts of Vojvodina which meet the criteria for classification at NUTS 3 level. The research had two objectives: (1) determining socioeconomic disparities of Vojvodina (at the level of administrative districts); (2) clustering of Vojvodina`s districts based on selected socio-economic indicators. The following socioeconomic indicators were used for comparison of Vojvodina`s districts: population density, dependency ratio, the share of the population with secondary, higher and university education, as well as the average net salary. Authors ranked Vojvodina`s districts for two reference periods (2010 and 2015), using the obtained values of selected indicators. Statistical software Statistica 13.2. was used for the purposes of the cluster analysis, and the results were displayed in the form of dendrograms. The results showed that there is an imbalance of development in Vojvodina`s rural districts in the context of selected socio-economic indicators. In accordance with this, the authors concluded that rural area of Južna Bačka district had the most favourable socioeconomic profile. By contrast, all rural districts of Banat had extremely unfavourable socioeconomic characteristics. The authors estimate that there will be no drastic changes in socioeconomic characteristics of Vojvodina`s districts in the coming period.

Keywords: *socioeconomic indicators, rural districts, Vojvodina, cluster analysis.*

RESEARCH ON VEGETATIVE CHARACTERISTICS OF SOME COTTON VARIETIES PRODUCED UNDER ORGANIC AND CONVENTIONAL CONDITIONS

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Abstract

Cotton is the most important raw material for the textile industry in today's world. Cotton is an industrial crop for which the most chemical fertilizers and pesticides are used. The excess chemicals cause pollution of land and water resources, destruction of biodiversity, and therefore deterioration in human health. One of the most discussed topics in today's world is sustainable agriculture. The biggest obstacle for sustainable agriculture is the use of chemicals. The most important issue when it comes to sustainable agriculture is, undoubtedly, organic agriculture. Organic cotton farmingdoes not use chemical inputs , which is of utmost importance in terms of soil, plant and human health. This study investigated two cotton varieties and four organic fertilizers used in Harran Plain organic and conventional farming. The aim of this study was to see the differences between plant characteristics in the cotton varieties produced under organic and conventional conditions, which would be useful in further work and help develop sustainable agriculture in the future.

Key words: *organic agriculture, conventional agriculture, sustainable agriculture, biodiversity.*

EFFECT OF COMPOSTING ON THE BIOCHEMICAL COMPOSITION OF FRESH AND DRIED FRUITS CHOKEBERRY (ARONIA MELANOCARPA L.)

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Abstract

The research was conducted in 2016 at the Research Institute of Mountain Stockbreeding and Agriculture in Troyan, Bulgaria. Chokeberry shrubs composted with compost (manure and straw), compost of compression of chokeberry fruit flesh and one with compression of Japanese quince were object of the present study. The waste products were obtained after fruit percolation into juices. Biochemical analysis of different types of composting and fresh and dried chokeberry fruits was made. The content of total polyphenols was the highest in the fruit composted with compost and the control – 505.00 mgGAE/100. Antioxidant activity was the greatest in compost with pressings of Japanese quince and the control. In dried fruits, the total polyphenols were the highest in the variant with compost compression of Chaenomeles sp. – 360.00 mgGAE/100 and the control – 410.00 mgGAE/100. Antioxidant activity was the greatest in compost with Japanese quince pressings – 800.00 μmolTE/100 g and compost with chokeberry compression – 600.00 μmolTE/100 g.

Keywords: *Aronia melanocarpa, Chaenomeles sp., Compost, Biochemical composition of friuts*

4. ENVIRONMENT PROTECTION AND NATURAL RESOURCES MANAGEMENT

IS THE TARGET REFERENCE POINT ($F_{0.1}$) VULNERABLE TO CHANGES OF NATURAL MORTALITY (M)? CASE OF ROUND *SARDINELLA*

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Abstract

To highlight a possible impact of changes in natural mortality (M) on the yield level of *S. aurita*, it was deemed beneficial to use the equations of natural mortality (M) Pauly (1980) and Djabali et al. (1994). Taking into account the recommendations of Froese and Proelss (2012), results generate two opposing scenarios. First, namely a state of not overfishing and not overfished with M = 0.79 yr^{-1} (Pauly 1980) [B = 14.09 g.; B_{MSY} = 9.73 g; F = 0.63 yr^{-1}; 1.1 × F_{MSY} = 1.05 yr-^{1}] and secondly an overfishing and overfished condition for M = 0.39 yr^{-1} (Djabali et al, 1994) [B = 19.181 g.; B_{MSY} = 34.72 g.; F = 1.03 yr^{-1}; 1.1 × F_{MSY} = 0.53 yr^{-1}]. Objectively, we will retain between these two opposite results the second case justified by the geographical origin of biological material used for the development of the empirical equation of (M) by Djabali et al. (1994). Indeed, the authors compiled data from 56 stocks of Mediterranean teleosts while Pauly's model (1980), based on 175 stocks, from polar to tropical areas, include only five Mediterranean data sets. Finally, we recommend to adjust the catch effort factor F_C = 1 to $F_{0.1}$ = 0.24 for M = 0.39 yr-^{1}. This precautionary approach would have as consequences the revaluation of the exploitable biomass from 16534 to 46860 tons. So, the application of this measure would allow long-term renewal of the stock of *S. aurita* in the central region of Algeria.

Keywords: *Sardinella aurita, Algeria, $F_{0.1}$, Overfishing, Overfished*.

CHANGES IN SOIL CHARACTERISTICS AND VEGETATION DIVERSITY IN RESPONSE TO HEAVY GRAZING ON MEDITERRANEAN PASTURES ALONG THE SHORES OF LAKE OUBEÏRA (ALGERIA)

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Abstract

Most fresh water wetlands in Algeria are places where farm animals graze. Our field experiment demonstrated that heavy grazing not only altered the diversity of palatable species but also reducing the diversity of herbs and shrubs on the native rangeland in Northeast Algeria. Adverse effects of overgrazing may include the trampling and removal of plant structural material critical for persistence of the plant in the environment. Some species have disappeared; *Medicago sativa L.* then *Medicago arabica L.* started to decline, while others have survived using morphological or some other forms of adaptation. Differences in grazing pressure may modify the relation between soil richness and fertility. Soil physicochemical characteristic, total aboveground biomass, number of species and relative abundance of groups and individual species were measured along a four moisture gradients in a pasture; flooded in part during the winter at the end fall. Four zones perpendicular to the moisture gradient. The zones far to the lake were quite different from that of the other zones with a substrate containing 89 to 94 % of sand. This aim of this work was to examine whether the soil moisture gradient creates physicochemical characteristics in soil and how variations in such physicochemical characteristics can influence the composition of species. The results indicate that the soil moisture was the major factor effecting plant species Moreover, the research also studied the response of the composition of herbaceous vegetation species and vegetation to heavy grazing. For instance, from 2011 to 2015 the amount of livestock increased from 13 546 to 35 241 sheeps.

Keywords: *wetlands, lake, shoreline, grassland, overgrazing, species composition, soil physicochemical characteristics.*

CHEMICAL ANALYSIS OF EXTRACTED OIL OF THE ATLAS PISTACHIO FRUIT

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Abstract

The pistachio Atlas or btoum: *Pistacia atlantica* Desf. is considered as a botanical curiosity in the arid environment where it colonizes diffusely considerable territory centered on Mediterranean countries with pronounced dry and hot season, this species is increasingly used in traditional medicine and food by local populations. With the aim to assess the nutritional quality of the oil extracted from its fruit, drupes of *P. atlantica* ssp. *atlantica* have been harvested in the Algerian Southwest region (El Bayadh) for physico-chemical, biochemical and organoleptic analysis, namely: yield, acid number and the acidity index, peroxide number, saponification index, refractive index, density, viscosity, iodine value, the total dry extract (TDE), moisture content, ash content, hydrogen potential (pH), titratable acidity and optical density (OD), as well as biochemical analyzes such as: proteins and total sugar content. For sensory analyzes, it is to examine the organoleptic properties of the oil traditionally extracted from the seeds of P. *atlantica* supplemented with the various percentages of the dates (Hmira variety) by the sense organs. The jury is made up of a variable group containing different categories of people. Two oil extraction methods were used, a chemical method using a continuous Soxhlet extractor and a traditional method which comprises adding a quantity of dates (variety Hmira) to pistachio seeds of Atlas, the latter is used by the people of southern Algeria. These analyzes revealed many interesting nutritional qualities of this oil especially if it is traditionally extracted, as they also demonstrated that the addition of dates with this oil improved its various features. This oil with 30% of dates had a better nutritional and organoleptic quality.

Keywords: *Pistacia atlantica, drupes-oil, nutritional quality, extraction, valorization.*

KINETIC MODELING AND OPTIMIZATION OF A BATCH ETHANOL PRODUCTION FROM INULIN BY *PICHIA CARIBBICA* (KC977491)

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Abstract

Bioethanol serves as liquid fuel or gasoline enhancer in many countries in response to the progressive depletion of the world's energetic resources. Production of bioethanol from inulin has been a subject of great interest for many years due to the large amount of existing and not completely developed technologies. The growth kinetics and modeling of ethanol production from inulin by *Pichia caribbica* (KC977491) were studied in a batch system. Unstructured models were proposed using the *logistic equation* for growth, the *Luedeking-Piret*equation for ethanol production and modified *Leudeking-Piret*model for substrate consumption. Kinetic parameters (X0, μm, m, n, p and q) were determined by nonlinear regression, using Levenberg-Marquart method implemented in a Mathcad program. Since the production of ethanol was associated with *P. caribbica*cell growth, a good agreement between model predictions and experimental data was obtained. Indeed, significant R^2 values of 0.91, 0.96, and 0.95 were observed for biomass, ethanol production and substrate consumption, respectively. Furthermore, analysis of variance (ANOVA) was also used to validate the proposed models. According to the obtained results, the predicted kinetic values and experimental data agreed well. Finally, it is possible to predict the development of *P. caribbica*using these models.

Keywords: *Pichia caribbica, inulin, bioethanol, numerical simulation.*

PHYTOCHEMICAL CHARACTERIZATION, ANTI-INFLAMMATORY AND ANTI-ULCER ACTIVITY OF A SPOANTANEOUS SUCCULENT DELOSPERMA RESEII

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Abstract

In Algeria, the study of traditional medicine and treatment by plants is of particular interest. This country is known by, the diversity of its climate, the nature of its soil and the wealth of its medicinal flora. To value this floral heritage with medicinal and economic interest, our choice concerned to an underestimated plant in traditional medicine, it is about the magic carpet (*Delosperma resei)*. This plant belongs to the family Aizoaceae. The genus Delosperma includes about 150 species of shrub and perennial succulent, a persistent or semi persistent foliage, growing in hilly plains. The current work reveals through the phytochemical screnning and the study of some pharmacological properties, anti-inflammatory and antiulcer activity, the therapeutic virtues of a spontaneous succulent *Delosperma reseii.*The reactions of characterization were used to identify the chemical constituents of *Delospermareseii* leaves. The results of our study revealed the wealth of our plant in tannins and saponosides. Leuco-anthocyans and flavonoids exist in average levels. However, the extract of saponins showed an anti-infammatory effect clearly lower than that generated by Diclofenac (the percentage of reduction is about 36.59%). The anti-inflammatory activity of the saponins extract appeared less effective than that of Diclofenac. The study of the anti-ulcer activity showed that the extract of tannins at 10% in the experimental group induced a decrease in the index of ulceration up to 20%. However, in the control group treated with Omeprazole, this index falls to 0 %. The tannins in the methanolic extract of the plant have shown an important anti-ulcer effect, but lower compared to Omeprazole.

Keywords: *Delospermaresii, anti-inflammatory, anti-ulcer, saponins, tannins.*

USE OF ELECTRODEPOSITION METHOD FOR THE INHIBITION OF CALCIUM CARBONATE

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Abstract

The groundwater Fourchi which supplies a large part of the city of Aïn M 'lila with drinking water defined as a hard water. It contains bicarbonate and calcium, it is therefore capable of depositing scale. The latter consists essentially of calcium carbonate, sparingly soluble salt which gives rise to scaling in water systems and industrial water consumption also leads to decreased heat transfer. The aim of our work is to evaluate and inhibit the furring power of the hard water of Fourchi using the electrodeposition method that is based on the reduction of dissolved oxygen at a fixed negative potential (-1 V) in the presence of polyphosphates which are adsorbed on the growth sites and inhibit crystal nucleation. The study of the accelerated scaling curve showed that Fourchi water is characterized by a scaling time of 20.3 min at 20 ˚C at which the current density reached 26.99 $\mu A/cm^2$. For tests at 50 °C showed that the temperature's effect has significantly reduced the scaling time compared to 20 °C, this is explained by the increased rate of electrochemical reactions. The current values obtained are more important when the amount of this inhibitor is increased. A high residual current is the result of a less compact and less deposit covering. The inhibitory effect of polyphosphates is pronounced from 0.05 mg/L added, so the inhibition occurs as soon as this product has a low concentration preventing germs $CaCO_3$ from growing. The scaling time is infinite for an addition of 2 mg/L polyphosphates where we do not obtain more deposit of $CaCO_3$.

Keywords: *calcium carbonate, electrodeposition method, polyphosphates, inhibitory effect.*

PHYSIOLOGICAL AND CARYOLOGICAL VARIABILITY OF SPONTANEOUS POPULATIONS OF *VICIA SATIVA* SPECIES IN ALGERIA

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Abstract

With a view to assess and to characterize phytogenetic resources of fodder and pastoral interest, tree spontaneous populations of vetch (*Vica sativa* L.), with variety fixed Servat 174 formed the subject of a behavior study at the experimental satiation of the university of Blida in Algeria during the2010/2011 crop year . This work had been completed by a phonological study followed with a biometrical then by a caryological study. In terms of morphological characterization, the extent of the heterogeneity observed at the collection stage and the diversity of the populations constitute excellent starting material to be subjected to pedigreed selection in order to achieve the first objective, the genetic purity of the progeny. At the end of this work, we announce that the spontaneous population Chemini B shows precocity in the stages beginning flowering and fructification beginning with respectively only 29 and 37 days after the date of lifting. On the other hand, population CheminiA, is the best for biometrical characters it is more productive in pods (with an average of 28, 25 pods per plant) and in grains (04 grains per pod). For a spontaneous population (origin from Béni Ali) the lines L2,L3 and L4 show precocity at flowering and the lines L2 and L4 are the best for yield component. The caryological study brings out the existence of one number in the two populations Chemini A and Chemini B (2n=2x=14) and the number of chromosome found for variety Servat 174 is 2n=2x=12.

Keywords: *Vicia sativa, phytogenetic resources, line. Spontaneous population.*

METHODOLOGICAL PROPOSAL FOR FOREST FIRE DAMAGE ESTIMATION IN SIERRAS CHICAS, CÓRDOBA, ARGENTINA.

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Abstract

In the province of Córdoba approximately 30% of the mountain area burns annually. The number of fires has increased in recent years, as well as the surface of native forest affected. The mountainous systems of Córdoba, the Sierras Chicas is the most punished by these sinister disasters, presenting the highest number of fires, the highest fire frequency and almost 25% of its surface area affected by them. Córdoba's law number 8751 of Fire Management states in article 15 that *"once the fire is over, the Application Authority must evaluate the damage and apply according to the current legislation, a soil recovery plan and/or reforestation plan if appropriate […]"*, although it is not explicitly stated how to evaluate the damage or which tools can be applied for it. The absence of an applicable methodology for forest fire damage estimation and a proper recovery plan for the injured environment, can cause the impacts to aggravate even above the expected levels. The aim of this study was to develop a methodology to estimate damage caused by forest fires in Sierras Chicas. The result was a forest fire classification matrix, readymade from the selection of variables representative of the level of damage (burnt area, post-fire soil depth, percentage of plant cover loss, inter alia), which were chosen through an exhaustive bibliographic exploratory study. Using tools such as remote sensing and field observation, numeric values were assigned to those variables. From the cross-analysis of these values, a qualitative level of damage was obtained (high, moderate, low). In correspondence with the damage level, different recovery/restoration techniques were proposed for the study area. The intention is for the matrix to be transferable to the evaluation and recovery of other burnt sites, and for it to complement law 8751, in order to apply it more effectively.

Keywords: *forest fires, damage, recovery, vegetation.*

ECO-BIOLOGICAL CHARACTERISTICS OF MEDICINAL PLANTS IN PROTECTION ZONE "YAZOVIR KONUSH" VILLAGE KONUSH (BULGARIA)

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Abstract

The present study examines the medical plants in the protected zone "Yazovir Konush", Konush village in the region of Plovdiv in Bulgaria. Eco-biological characteristic of the medical plants is made, and the species are categorized by biological groups, by life forms, by floral elements, and by time of flowering. The plants are classified by ecological groups according their regard towards the water, the light and the heat as a factor. Conclusions for the presence by percentage of medicinal flora in the protected zone are made. The research held in the period 2012-2014 of the medicinal plants in protected zone "Yazovir Konush" shows that there are 100 species plants from 82 genera and 40 families. Among these plants the majority are the perennial herbaceous species, the hemicryptophytes, the species with European and Mediterranean origin, the thermophytes, the mezophytes and the heliophytes.

Keywords: *Protected zone "Yazovir Konush", NATURE 2000, medical flora*.

COMPARATIVE ANALYSIS OF SOIL WATER MANAGEMENT TECHNOLOGIES (RWH): EFFECTS ON SOIL WATER CONSERVATION EFFICIENCY (CASE OF THE RUZIZI PLAIN)

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Abstract

This study was conducted to test the effectiveness of some water management technologies adapted in some regions to maize yield to contribute to the rational management of soil water under current conditions of rainfall deficit of the Ruzizi plain, an area where aridity seems to be severe. A split-plot device, with 6 plots (8x5m) per block, was set up. Two main factors were studied, including the three-level technique (Zaï, Tied ridges and flat tillage) and the fertilizer with two levels (with and without NPK application). The test crop was corn for its rapid response and the rank it occupies in the human food of the region. The Tied ridges technique allowed conserving more water than all the other RWH techniques especially in the 6 leaf stage deployed. Indeed, the soil moisture was very high between 40-50cm deep at all corn growth stages. On the other hand, flat tillage appears to have low water content, especially between 0-10 cm deep at the seed filling stage. In terms of yield, the Tied ridges technology with NPK application had recorded, once again, a better grain yield of corn. In addition, the Zaï with no NPK contribution showed a low yield.

Key words: *water conservation technique, NPK, Yield, maize*

CRITICAL ANALYSIS OF CLIMATIC TRENDS AND FORECAST OF IRRIGATION CALENDAR FOR MAIZE IN THE RUZIZI RIVER AREA IN DEMOCRATIC REPUBLIC OF THE CONGO

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Abstract

In the context of global climate change, it is necessary to evaluate the changes generated on global and fine scales, such as maize agro-system in the Ruzizi river area in Democratic Republic of the Congo, particularly in terms of frequencies of thermal extremes and precipitation. This article deals on the critical analysis of Climatic Trends and Irrigation Schedule for maize. Monitoring conducted in the period 1965-1995 provided data retrieved from the meteorological station. The data were analyzed and then the selected models were used to predict the situation until 2045. Hence we can assert that the change in the distribution of precipitation has a direct effect on the choice of planting date. The exhaustion will decrease because in 2045 we will have a large amount of precipitation with a more or less balanced distribution. This can be explained by the fact that the effects of climate change on agriculture result in a change in the distribution of precipitation causing changes in the cropping calendar. Climate change will cause difficulties for farmers to heir agricultural practices, as time indicators relating to the seasons will lose all reference.

Key words: *Models, maize, climate change, irrigation.*

STATUS OF UNDERGROUND DRAINAGE IN EASTERN CROATIA AND DRAINED SOIL IMPROVEMENT BY AGROAMELIORATION

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Abstract

Croatia has about 2.3 million hectares of agricultural land, of which one third is state owned. About 167 thousand hectares of agricultural land in Croatia are covered by pipe drainage. Revitalization of pipe drainage and construction of new drainage systems are important potentials for improvement of agricultural production in Croatia. Intensification of drainage was carried out mainly from 1976 to 1990, mostly on agricultural land belonging to state owned farms. Eastern Croatia accounts for 30% of agricultural land at state level and pipe drainage is installed on 122,390.5 ha or 73% of total drained area in Croatia and 17% of agricultural land of the region. More than 20% of agricultural land is drained in three counties of the region (Vukovar and Srijem, Brod and Posavina, Virovitica and Podravina Counties). In general, maize and wheat yields in Eastern Croatia are by about 30% higher compared to the state average. In this regard, we presume that pipe drainage has given a considerable positive contribution, particularly under wet year conditions. Current status of pipe drainage functionality is mainly inadequate and reconstruction and regular servicing are needed. In spite of soil reclamation and pipe drainage management, yields of main field crops mainly in the southern lowland part of the region were accompanied with inadequate supplies of phosphorus and potassium. These problems were eliminated by adequate agroamelioration, for example, ameliorative fertilization. Nutritional problems could be also alleviated by selection of more tolerant field crop genotypes.

Keywords: *underground drainage system, pipe drainage, current status, reconstruction*

CLIMATE VULNERABILITY ASSESSMENT AND SENSITIVITY ANALYSIS IN WATERSHED COMMUNITIES OF KERALA, INDIA

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Abstract

Smallholder farmers, over 1.5 billion people worldwide, are disproportionately vulnerable to the impacts of climate change as a result of poverty and reliance on natural resources. For them, climate change is a daily reality that threatens their source of livelihood: agriculture. In India, more than fifty percent of farmers rely on rainfed agriculture. Here comes the importance of Watershed Development Programmes (WDPs) as they have the potential to make a significant contribution to enhance the resilience of rain-fed farmers through natural resource management and livelihood support system activities. The Government of India initiated WDPs for rainfed areas more than five decades ago. In this context, our study analyses and compares the effectiveness of the WDPs against climate vulnerability in one of the most vulnerable hotspots in Kerala, India. For this, we deducted a Climate Vulnerability Index (CVI), which comprises of three dimensions of vulnerability, ten major components and 59 individual indicators. The primary data used for this study were obtained from household surveys and key informant interviews. We used bootstrapping method and conducted a sensitivity analysis to test the performance of the CVI among three different communities. Even though the CVIs are similar, we found significant differences in sensitivity and exposure dimensions. Further, the sensitivity analysis shows that 'Livelihood Strategies' and 'Social Network' are the most influencing major components. The bootstrapping approach proved to be very helpful in testing for the robustness of our results and is replicable to evaluate the potential effectiveness of various other climate change programmes.

Key words: *Adaptive capacity, bootstrapping, climate vulnerability, sensitivity analysis.*

WESTERN BALKAN COUNTRIES AS FIELD LABORATORY FOR THE CLIMATE CHANGE IN CENTRAL EUROPE? – INDICATIONS FROM PESTS AND BENEFICIALS IN ARABLE CROPS IN GERMANY, CROATIA AND SERBIA

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Abstract

Climate change scenarios for the next 80 years indicate,for the summer period in Germany, an increase of temperature of 3,0-3,5 °C and a decrease of rainfall of 10-15%. These relationshave been already realized today in some areas with intensive agricultural crop production of the Western Balkan Countries (WBC), for instance in Slavonia (Croatia), in the Vojvodina (Serbia) and some areas of Bosnia-Herzegovina. Within an EU-project (SEE-ERA-PLUS.NET) in Croatia, Serbia and Germany, an equally designed 2-year field experiment was implemented to assess the impact of differently managed arable fields (conventional, integrated, organic) on pest insects and beneficials in an oilseed rape/winter wheat crop rotation. Management systems differed in tillage, fertilizer and pesticide input, weed control, row space and application of trap-crop-strips in "integrated" and "organic" oilseed rape. Comparing the results from Germany and Western Balkan countries the indications are:

a) A shift of phenologies of certain pest insects: Stem weevils (e.g. *Ceutorhynchus pallidactylus*) which invade OSR fields in Germany app. mid of March occur in the WBC already in the first week of February in reasonable numbers. Some were recorded already in autumn before and thus, obviously overwinter in OSR fields. Thus, monitoring by farmers, and control measures have to start already in middle of the winter (January).

b) Pests which are of little importance (e.g. *Athalia rosae*) or even unknown in Germany (e.g. *Epicometis hirta*) become more and more important.

c) Changes regarding the epigaeic predators and their function as biocontrol agents: The xerothermophile ground beetle genus *Brachinus* (bombardier beetles) has been recorded in arable fields of Croatia and Serbia with four species,and covers in Croatia app. 50% of all ground beetles from pitfall traps, and in Serbia app. 15%. In Germany only one species (*Brachinus crepitans*) was recorded with 1,4%. The German record is remarkable because within a 3-years-survey 30 years ago on exactly the same fields no *Brachinus*-specimens were recorded. The species was restricted in Germany to vineyards and other sun-exposed locations. Thus, we can interpret the occurrence of *Brachinus crepitans* in average Northern German arable fields as a precursor of the climatic change. However, as larvae of *Brachinus*-species are parasitoids of pupae of other ground beetles, an increase of *Brachinus*-populations (e.g. in Croatia) can have detrimental effects regarding the effectiveness of the ground beetle assemblage as biocontrol agent of insect pests.

Keywords: *climate change, oilseed rape, winter wheat, beneficials, insect pests*

DISSIPATION AND TRANSPORT OF QUINMERAC HERBICIDE IN RAPESEED CULTIVATED FIELD PLOTS

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Abstract

The environmental fate of the herbicide quinmerac was investigated under field conditions in a rape seed cultivation. The experimental field (silty clay soil) was divided in two groups of six plots each with a plot dimension of 4x10 m^2. One group of plots was used for rapeseed cultivation while the other one remained bare. Two different slopes (1% and 5%) were formed for each group. In the lower side of every plot a runoff collector was established. Soil samples were randomly taken at two depths: 0–10 and 10–20 cm. Quinmerac was applied at a rate of 250 g/ha. Water samples were extracted using SPE method when for soil and sediment samples a modified QuEChERS method was used. All samples were analyzed by liquid chromatography–mass spectrometry instrumentation. The herbicide was detectable, in the first soil layer, up to 68 days after application (DAA). The initial concentrations ranged from 0.201 to 0.258 μg g^{-1}, and the half-life was calculated between 7.13 and 8.51 days (first-order kinetics). The compound was detected at the soil layer of 10–20 cm from 2 to 82 DAA. Quinmerac was present in runoff water samples until 71 DAA. Relatively high amounts of quinmerac (up to 4.85% of the initial applied active ingredient) were transferred by runoff. The major amounts (more than 75% of the total losses) were transferred at the first runoff event (12 DAA). Minor amounts of the herbicide (less than 0.05% of the initial applied active ingredient) were transferred through the sediment.

Keywords: *Quinmerac, soil dissipation, kinetics, runoff water, sediment.*

IMPACT ASSESSMENT OF PESTICIDE APPLICATION ON COCONUT PLANTATION SOIL BACTERIAL DIVERSITY AND SOIL FERTILITY

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Abstract

Indiscriminate and excessive use of toxic pesticides damaged not only the environment and agriculture but also entered into the food chain. The commercialization of agricultural products is the main reason for excessive use of pesticide. They were introduced for green revolution package in Indian agriculture. The intention of the introduction of pesticides was to control and prevent insect pests and diseases in the field crops and of course, initially the use of pesticides reduced pest attack and thereby increased the crop yield as expected. Increased use of chemical pesticides excessively makes the situation from bad to worse. Human activities such as pesticide, fungicide application on soil will affect equally to soil nutrients as well as microbial community. Hence, the present study was carried out to detect the effect of pesticides on soil bacterial population and soil fertility. Soil samples were collected from pesticide applied and non-pesticide applied coconut plantation field. Soil samples were analyzed for soil micro- and macro nutrients and soil bacterial population analyzed using carbohydrate utilization test and compared for bacterial population diversity. This present study concludes that in many sampling areas pesticide contaminated soil samples have poor soil quality and less bacterial population.

Keywords: *pesticide, bacterial population, diversity, soil fertility*

SOIL ORGANIC MATTER OF AGGREGATES FOLLOWS DIFFERENT PATTERNS IN THE LAND USE CHANGE FROM RANGELAND TO DIFFERENT AGRICULTURAL LANDS

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Abstract

Because of population growth in most countries in the Middle East, the agricultural use of natural ecosystem is increasing. The type of cultivated production could affect soil quality parameters in the land use changes from the rangeland into agriculture. In this study, we selected three types of horti-agricultural lands (wheat-land, pea-land and garden) and compared SOM (soil organic matter) fractions and total nitrogen with adjacent natural rangeland. We aimed to introduce a suitable agricultural product to native farmers in which soil qualities could be conserved after land use changes from natural rangeland into agricultural lands. The results showed that in general, TOM (total organic matter), POM (particulate organic matter) and TN (total nitrogen) were highest in the rangeland compared to the three horti-agricultural lands in intact soil, macro- and micro-aggregates. Nevertheless, TOM content in garden was higher than the two other land uses and there was no significant difference of TN between natural rangeland and garden in intact soil. The highest values of POM were obtained in the natural rangeland and garden and the lowest value of POM were obtained in the pea- and wheat-land in macro-aggregates. In micro-aggregates, TOM, POM and TN were highest in the rangeland and showed similar pattern in the three horti-agricultural lands. We discussed that decreasing of plant species diversity might decrease soil quality in land use changes from the rangeland into agriculture. Compared to pea- and wheat-land, garden was received less cultivation practices such as ploughing and had higher vegetative cover, leading to a less negative impact on soil qualitative parameters in land use changes projects from rangeland into agriculture. We conclude that garden is a better option in rangeland use changes into agriculture compared to other agricultural cultivations.

Key words: *Land use change, Natural ecosystem, Qualitative soil parameters, Middle East.*

PRELIMINARY STUDY OF TOXIC ELEMENTS IN SERPENTINITE-DERIVED SOILS IN BASILICATA REGION OF SOUTHERN ITALY

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Abstract

A preliminary study to investigate the concentration levels of toxic elements was carried out in 10 serpentinite-derivative soils samples developed between Castelluccio Episcopia and Latronico (Basilicata Region, Southern Italy), in order to understand their possible contribution to the health problems caused by asbestos exposure. Indeed, asbestos minerals, for different structural reasons, have a high capability to host a large number of toxic elements and some researchers claimed that asbestos fibres may play a passive role in producing diseases as carriers of trace elements. The human health risks are based on the potential fibres inhalation when they become airborne through rocks (e.g., serpentinite) weathering or human activities producing dust. An association with neighbourhood exposure to asbestos and an increased risk of deaths from lung diseases has been documented among the persons who live near naturally occurring asbestos (NOA) deposits around the world including in Basilicata region (Italy). Previous work suggests that the cytotoxicity of asbestos may be also related to the minor and trace elements present as impurities in their structure. Agricultural soil samples have been collected mainly near the inhabited centers and characterized by using different analytical techniques such as XRF, XRPD, ICP-MS TEM/AEM, TG/DSC. Preliminary results have shown that soil samples contain asbestos minerals (e.g., chrysotile asbestos, tremolite-actinolite) albite, anorthite, clay minerals, and oxides in various amounts. The values of trace metals in our soil samples were very high. Three elements (Cr, Co and Ni) exceeded in some soils the regulatory thresholds for public, private and residential green use. A high amount of Cr was present in serpentine minerals while Ni was predominantly found in amphiboles asbestos. This new knowledge could be used to identify eventually health hazard areas owing to asbestos fiber.

Keywords: *Southern Italy, Naturally Occurring Asbestos (NOA), Mineralogical characterization.*

MANAGEMENT STRATEGIES FOR RECOVERY OF GRASSLAND HABITAT DEGRADATION: A CASE STUDY IN THE CENTRAL APENNINES (ITALY)

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Abstract

Authors present an interdisciplinary study carried out on a semi-natural grassland (EC habitat code 6210*) colonised by *Asphodelus macrocarpus* within a Natura 2000 site in the central Apennines (Italy). Due to its high level of vegetative propagation, *Asphodelus macrocarpus* is an aggressively spreading native competitor species that can produce alterations to and loss of grassland habitats under conditions of underuse and/or abandonment of traditional management. This experimental trial lasted 4 years (2012-2015), and applied three different treatments (chopping, mowing with and without removal of cut material). The results highlight that disturbances derived from the treatments applied can have positive effects on biodiversity. The decrease in abundance of invasive and dominant species (especially perennial grasses and *Asphodelus macrocarpus*) corresponded to large increases in short-lived species, early spring flowering species, and species typically present in grasslands. In particular, mowing (both with and without removal of cut material) was the most effective treatment for recovery of the grassland, even over the short term. Despite having positive effects on species diversity, the chopping treatment is not a viable alternative to mowing, especially because of the risk of eutrophication over time, and the consequent settlement and increase in nitrophilous species. Based on these data, for the rapid recovery of grassland biodiversity, we suggest immediate mowing around mid-June. For maintenance of biodiversity in the short term, mowing can be alternated with chopping, as a cheaper and easier practice considering the marginality of the area.

Keywords: *Chopping, Floristic turnover, Mowing, productivity, Restoration ecology, Vegetation dynamism*.

FLUORESCENCE TRAITS OF INVASIVE SPECIES IN LITHUANIA

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Abstract

Some worldwide invasive plant species spread successfully throughout natural and semi-natural habitats in Lithuania. Accordingly, measures have been strongly recommended to prevent the introduction of such species and their spreading to new areas, or to manage unwanted populations. The proliferation of invasive species abundancy in new environments indicates a good supply of resources at physiological levels, viz. photosynthesis. Therefore, the assessment of chlorophyll fluorescence as a non-invasive intrinsic investigation of photosynthesis can give detailed information and be applied for understanding of invasive species adaption to a new environment. The research was aimed at the evaluation of the fluorescence parameters of invasive plant species (*Fallopia sachalinensis* (*F sach*), *Heracleum sosnovskyi* (*H sasn*), *Rumex confertus* (*R conf*)), the indicators of their physiological acclimation to a new environment, by identifying traits that could explain their success in terms of invading new territories. Fluorescence gains were measured *in situ* at the different growth stages during the vegetation period of invasive species in 10 replications using a light-adapted pulse-amplitude modulation method. The main parameters of the photosynthetic system II (PSII), e.g., fluorescence yield (Fs) in the light and maximal fluorescence (Fms) during the light flash were recorded in and used to determine the quantum yield of electron transport (Y). Between investigated species significantly ($p<0.000$) higher means of Fs, the index of photosynthetic excitation in light, and Fms, the index of efficiency of PSII, were observed in light-adapted leaves of *H sosn* (412.7 and 399.32 μmol m^{-2} s^{-1}) and *F sach* (399.32 and 1726.90 μmol m^{-2} s^{-1}). Consequently, the derivative means of effective quantum yield (Y), absorbed and distributed to PSII electron quanta (ETR) also had maximal values in *H sosn* (0.8 and 38.1 μmol m^{-2} s^{-1}) and *F sach* (0.76 and 38.36 μmol m^{-2} s^{-1}). The evaluated fluorescence parameters revealed worthy photosynthetic adaptation and explained forceful spread of the assessed invasive species in Lithuania.

Key words: *Fluorescence parameters, Invasive plant species*.

AMPHIPODA (CRUSTACEA) AS INDICATORS OF THE POLLUTION OF THE WATERS IN MONTENEGRO AND PROBLEM OF ITS PROTECTION

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Abstract

In the epigean and subterranean waters of Montenegro numerous taxa of Amphipoda (10 families, 18 genera and nearly 60 species and subspecies are present, nearly half of them are endemic. Amphipoda are settled in all types of the fresh- and brackish epigean and subterranean more or less clean waters (subterranean waters, caves, springs, wells, torrents, rivers, lakes). As the amphipods are very sensitive on the pollution, they are good indicators of the pollution of the waters. Among numerous known species, various species support different degree of water pollution (epigean taxa *Gammarus roeselii*, *Synurella ambulans*, support higher pollution than *Gammarus balcanicus*). In the subterranean waters, *Niphargus podgoricensis* supports higher pollution than *Hadzia crispata*, etc). Problem of protection of this fauna is very high and urgent because of intensive anthropogenic activity. Regarding Amphipoda, two main types of subterranean waters are present: fast running subterranean waters (subterranean torrents, waters in caves, springs, etc.) settled with specific Amphipoda fauna (*Niphargus carcerarius*, *N. vjetrenicensis kusceri*, etc.) and slowly running subterranean waters (hyporheic waters of wells, subterranean waters under the bed of the rivers, etc.) settled with another specific Amphipoda fauna (*Hadzia crispata*, *Niphargus asper*, *N. serbicus*, etc.) and its protection is connected with the general protection of the subterranean waters. Protection of the epigean Amphipoda fauna is rather different and more connected to the protection of type-localities of single endemic taxa. Protection of the Amphipoda in brackish waters (epigean and subterranean) is connected to the expansion of touristic activity along the sea coast (beaches and hotels).

Keywords: *Amphipoda, water pollution, protection, Montenegro.*

MOROCCAN WILD LEAFY VEGETABLES AS POTENTIAL SOURCES OF NUTRIENTS

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Abstract

Morocco's vascular flora is one of the richest in the Mediterranean region. Wild edible plants are used to make many popular traditional dishes. There are no data on the nutritional composition of these plants in Morocco. The aim of the present study was to fill this gap by determining the proximate and mineral composition of some wild edible plants traditionally used as vegetables in El Jadida's rural area in Morocco. Six species, belonging to five botanical families, were selected: *Chenopodium murale* L., *Foeniculum vulgare* Mill., *Lavatera cretica* L., *Ridolfia segetum* Moris, *Scolymus hispanicus* L. and *Rumex Pulcher* L. The researchers used AOAC official methods to determine the proximate composition and the inductively coupled plasma-atomic emission spectrometry to analyze the mineral composition. The preliminary finding of this study showed that the average levels in the edible parts were 88.3±3.0 for moisture, 2.79±1.05 for proteins and 0.15 ±0.05 for lipids in g per 100 g fw. Most of the wild vegetables analyzed are a rich source of minerals. Yet, high variations were observed between the six species including their content of Ca (70.0-272 mg/100 g) and Fe (0.65-3.53 mg/100 g). Based on these primary results, the studied wild vegetables could be considered a good nutritive potential. The promotion of these under-exploited products could diversify consumed vegetables and improve the nutritional status of the local population.

Key words: *Food composition, Nutritional composition, Traditional Mediterranean diet, Wild food plants, Morocco.*

UTILIZATION OF WILD EDIBLE PLANTS IN TRADITIONAL RECIPES: SUSTAINING A MOROCCAN CULINARY HERITAGE

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Abstract

Wild edible plants (WEPs) traditional knowledge is largely declining in the Mediterranean countries diet. Even there are some inventories of wild edible taxa consumed around the study region; data on traditional recipes are scarce. The present study is a contribution to a better understanding of how WEPs are consumed in Morocco. It aimed to investigate the knowledge related to their utilization in traditional recipes by the population in three rural communes in El Jadida province. An ethnobotanical survey was carried out among 80 women native or long-time residents in the study area using a semi-structured questionnaire. All informants were 45 years and older. The data collected for each plant focused on the local name, the consumed part, the preparation method and the collecting season. A total of 71 WEPs distributed into 30 families have been identified as being used, presently or in the past, in the study area. Ten different traditional recipes, prepared mainly in winter, from leaves, stems, flowers or roots were identified. "Beqoula" was found to be the most common traditional WEPs-based dish among the local population. We suggest extending this type of studies to other parts of the country in the aim to safeguard this heritage before its erosion. Also, it would be interesting to investigate the nutritional potential of WEPs to promote and revive the interest for these underutilized traditional food products.

Keywords: *Beqoula, Mediterranean diet, Morocco, Traditional food, Wild food plants.*

DEVELOPMENT AND IMPLEMENTATION OF INNOVATIVE BIOTECHNOLOGICAL PRODUCT FOR AGRICULTURE TO REDUCE NITROGEN POLLUTION

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Abstract

Human activities have changed the natural flow of nitrogen (N), resulting in the creation of numerous environmental problems such as: contamination of drinking water, fresh water eutrophication, biodiversity reduction in ecosystems, stratospheric ozone depletion or acidification of soils. Agricultural activity is responsible even for more than 60% of nitrogen pollutants incoming to the waters. The excess of N from crops and animal breeding can leach through the shallow ground water and finally enter the surface waters through point or diffuse discharges. The water output from the intensively agriculturally used areas contains even 20 times more biogenic substances than output from semi natural areas. In this context, it is very important to search and develop effective, low-cost solutions and environment-friendly technologies, which are in a symbiotic interaction with the surrounding landscape. It will serve to limit the outflow of biogenic compounds into groundwater and surface water. In Poland, many medium or small farms do not have adequate infrastructure for the storage of organic fertilizers. Therefore, we propose a prototype solution with application of the barrier with straw/carbon mix as an alternative, in relation to the concrete manure plates, for removing of pollution of land and water as a result of the infiltration of nitrogen compounds (nitrate, nitrite and ammonia) from composted manure. The aim of the project "AZOSTOP" is a development of final construction and production of modules to remove nitrogen compounds together with their implementation in breeding farms.

Keywords: *nitrate, ammonia, carbon substrate, organic manure, microorganisms.*

Acknowledgement

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NATURAL EVALUATION OF RURAL NASIELSK COMMUNE AREA FOR LANDSCAPE MANAGEMENT IN TOURISTIC ASPECT (POLAND)

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Abstract

Natural values are the main potential aspects for development of rural communities. It was presented natural evaluation method focused on classification values of landscape. The whole stages of natural evaluation depend on the main purpose of research. The main question is: it will be doing for example for toursim or protection aspects? Proper selected criteria of natural evaluation are first success of this method. The purpose of this paper was to classify natural values of Nasielsk commune and to formulate directions for protection and touristic aspects. Nasielsk commune is located in the north-east part of Poland. It was recognized natural elements and prepared selected criteria of evaluation as diversity of plant communities, naturalness of vegetation, protected forms, water surface, Natura 2000 habitats, vegetation availably for recreation. Natural evaluation included division of study area into landscape special units, formulated criteria to assessment, scale of values. Scale of values was characterized by points from 1 to 5 points. Areas with different natural values were distinguished. Areas were classified into three groups: areas with high natural values, areas with medium natural values and areas with low natural values. The last stage of work was formulating directions for protection and tourism on studied area.

Keywords*: Evaluation, Rural areas, Landscape management.*

TESTING THE RAPID IDENTIFICATION SYSTEM AS AN INNOVATIVE TOOL FOR ENVIRONMENTAL ASSESSMENT OF FARMS

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Abstract

The aim of the research was the valorization of farms with different areas, specialization and intensity of production using a comprehensive evaluation method. The scope of work covered 404 farms with data from 2008-2014. The area of the farms ranged from 1 to 1001 ha. The elements subjected to the bonitational assessment were divided into two modules - production and environmental modules. The production module included: the share of selected agricultural land and crop groups, the use of mineral nitrogen and phosphorus fertilizers, industrial feed consumption and animal stocking. The following elements were evaluated in the environmental module: dates of application of manures and number of days to be mixed with soil, method of preparation of silage, management of domestic sewage, size of buildings for storage of solid and liquid manures, year of construction of slabs for solid manure, tanks and cesspool. The points received in individual farms ranged from 49 to 148. Three groups of farms were identified on the basis of cluster analysis. The results showed that such elements as specialization, farm size, a share of arable land and grassland, stocking density, mineral fertilizers and industrial feed consumption were important for the identification of potentially hazardous farms. Differences in nitrogen fertilizer consumption varied in particular groups of farms from 16 to 169 N kg·ha^{-1}. Nitrogen equivalent in industrial feeds indicated the consumption even at 500 N kg·ha^{-1}.

Keywords: *rapid identification system (RIS), comprehensive assessment of farms, non-point pollution*

SELECTION OF RIVER BANK REINFORCEMENTS USING 1D STEADY-FLOW HYDRAULIC MODELLING: A POLISH CARPATHIAN CASE STUDY

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Abstract

The aim of the paper was to select an optimum river bank reinforcement for river bank stability against scouring due to critical velocityof water causing river bank erosion. The research was performed on the Wielki Rogoźnik River, which is located in Nowy Targ, the only one meandrous river in the Podhale region (Polish Carpathians). Using 1Dsteady-flow hydraulic model HECRAS the hydraulic condition of the river, with the special attention to critical scouring velocity, was determinate. The analysis and the calculations were carried on for three different slopes of river banks: 2:1, 3:1 and 5:1. Also, three different values of discharges of different probability levels were used in simulations: $Q_{50\%}$, $Q_{10\%}$ and $Q_{1\%}$. As a result of modeling the rip-rap reinforcement was proposed to use along the Wielki Rogoźnik River banks as the best solution against river banks erosion.

Keywords: *reinforcement, 1D hydraulic modeling, river bank, river bank erosion.*

APPLICATION OF THE WEIBULL SURVIVAL FUNCTION FOR THE ESTIMATION OF THE ROOT COHESION OF THE SELECTED TREE SPECIES

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Abstract

One of the main effects of plants contributing to slope stability is related to the transfer of tensile forces occurring in the soil by root systems of plants. A large number of factors influencing the development of root systems cause high variability of their tensile strength. So, the use of statistical methods seems to be increasingly justified while describing this characteristic. The study aimed at the determination of the tensile strength of the roots of the common birch, European hornbeam and Scots pine and at the estimation of values of Weibull functions parameters (ω, λ) describing the variability of this characteristic depending on the species and the size of the root diameters. Tensile strength tests were carried out on the root samples that were placed in water at least one day prior to the test, in order to obtain their maximum saturation. The results of the tensile strength tests and Weibull function parameters values were used for the calculation of root cohesion using a numerical model (a fiber bundle model) proposed by Schwarz et al. (2013). The test results revealed that the roots of the European hornbeam had statistically significantly higher tensile strength (average 31.0 MPa) than the roots of the common birch and Scots pine (18.2 and 18.1 MPa, respectively). The results of the analysis showed that the values of Weibull parameters are generally small, which is consistent with the results of Schwarz et al. (2013). The obtained values of the ω parameter indicate high variability of the tensile strength characteristics of the roots of the examined plant species. It has also been shown that Weibull's method of selection of parameters can have a significant effect on the results of the root cohesion calculations. Moreover, the root cohesion values obtained by the fiber bundle model using the Weibull function were 37-56% smaller than those obtained by using the classic Wu-Waldron model.

Key words: *Root reinforcement, Tensile strength, Weibull survival function.*

CONTRIBUTION TO THE KNOLEDGE OF THE BIOLOGICAL CYCLE OF THE LEAF MINING MOTH CAMERARIA OHRIDELLA DESCHKA DIMIC SPECIES

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Abstract

In the period 2014-2015 were made observations on mining moth chestnut *Cameraria ohridella* Deschka Dimic, in parks and chestnut zone alignments in Huși from Vaslui County. For observations in each year are purchased the pheromone traps type atra-CAM at the Institute of Chemistry "Raluca Ripan" from Cluj. In each of the two years of observations and proceeded to the systematic recording of data on the occurrence and flying insect oviposition, completing the larval stage, the pupa stage and replay each generation cycle.Since visual observations in the field are difficult to track in the number of generations, thanks to the emergence staggered butterflies and then deposit eggs, emergence of larvae of the first egg, so to establish better during each stage in the field I doing so: - I chose trees that have branches below, so that they can get to them from these branches have chosen 10 leaves that we signed with a thread and on them we followed all stages from egg to pupa and adult.On these leaves observation of 3 in 3 days, I followed and noted laying and still other stages: larva, pupa and adult.Basically, I followed the stage of egg, larva, pupa to butterfly leaving the mine by the same leaves and leaflets.With the help of Agroexpert system was calculated sum of effective temperatures required at each stage of development.

Keywords: *mining moth, Chestnut, life cycle, stages of development*

OBSERVATIONS ON FLIGHT DYNAMICS OF THE BUTTERFLY SPECIES OF *CAMERARIA ORHIDELLA DESCHKA & DIMIC* IN 2013-2015

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Abstract

The chestnut moth leaf miner, *Cameraria ohridella* Deschka & Dimic is a dangerous pest in the area of Huși , that causes more and more damage every year. In this paper, the authors describe the flight dynamics of the butterflies monitored with the help of traps, type Atra -CAM. The butterflies' flight situation was as it follows: in 2013 the flight of the hibernate generation of butterflies started on May 8th , and it was finished on May 21st. The maximum flight curve was recorded on May 21st when 389 samples were captured; the flight of the first generation of butterflies started on June 21st, and it concluded on June 31st. The maximum flight curve was recorded on June30th when 410 samples were captured; the flight of the second generation of butterflies started on August 1st, and it concluded on September 3rd. The maximum flight curve was recorded on August 15th when 400 samples were captured. In 2014, the flight of the hibernate generation of butterflies began on May 9th and it finished on June 21st. The maximum flight curve was recorded on May 31st when 380 samples were captured; the flight of the first generation of butterflies started on June 26th and it finished on July 31st. The maximum flight curve was recorded on July 13th, when the 290 samples were captured; the flight of the second generation of butterflies started on August 3rd and it finished on September 15th. The maximum flight curve was recorded on August 15th, when a total of 400 samples were gatering.

Key words: *flight of butterflies, dynamic, traps, AtraCam.*

NATURE RESERVE «CAPE MARTYAN» AS AN UNIQUE SUB-MEDITERRANEAN LANDSCAPE IN THE SOUTHERN COAST OF THE CRIMEA (RUSSIA)

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Abstract

Nature Reserve "Cape Martyan" was established to preserve relict sub-Mediterranean Crimean juniper forests on their Northern area boundary on the Nikita Botanical Gardens lands in 1973. The monitoring of the unique native complex components with the 120 hectares of land and 120 hectares of area of the Black Sea has been done for almost 45 years. The landscapes, geomorphology, geology, soil, climate and vegetation have been described and studied in the program of "Chronicle of Nature". Their maps and the cadaster of biota has been made. The Nature Reserve posits a high level of a biological diversity of a ground- and the sea biota, as well as the occasional species, protected by national Red Books and International Conventions. Its biological diversity includes: sea algae – 278, moss – 63, fungus, lichen and myxomicetes – 580, vascular plants – 555, invertebrates – 1045, vertebral animals – 262 species. A protected status applys on 71 animal species, algae – 13, moss – 2, lichen – 2, vascular plants – 45, macromycetes – 11 species. To sum it up, a high level of the "Cape Martyan" biological diversity and sozological status becomes clear by uniqueness of a sub-Mediterranean landscape on the Northern boundary of the Mediterranean area.

Keywords: *nature reserve, sub-Mediterranean landscape, biota, rare and occasional species, the Southern Coast of the Crimea.*

STRENGTHENING THE EVALUATION OF CARBON SEQUESTRATION CAPACITY FOR RUSSIAN FORESTS

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Abstract

The Forest Resource Assessment FAO UN (2015) shows that the area of Russian forests has reached 20% total forest area of the world. Forests cover 67% of the territory of the Russian Federation and are important for stabilizing climate in the country, as well as on the planet. In the context of the Paris Agreement, the problem of objective and complete accounting of the carbon sink of Russian forests is of a great importance. The controversy over how to improve the carbon balance assessment for the Russian national forests is discussed. According to the preliminary calculations, three factors lead to underestimation of the carbon sink in Russian forests, up to ~340±75 million tons per year in total: 1. The methodology of assessments 2. Methodological ambiguity of forest classification, that excludes some areas from managed forests and therefore from assessment, for instance ~ 200 million ha of "inaccessible" forests in remote regions and 74.9 million ha of shrubs 3. The evaluation of carbon balance for the latest national inventory report under the UNFCCC (United Nations Framework Convention on Climate Change) and the Kyoto Protocol (2015) doubled the carbon losses caused by timber harvest and wood removal and overestimated forest fire losses. New results of the Russian forests carbon sink assessment corrected according to the discussed approach and based on State Forest Register data following the IPCC methodology are presented. This assessment for 2015 Net Ecosystem Production (NEP) of the Russian forests is 630±110 million tons C/year including about 140 million tons C/year accumulated in dead biomass.

Keywords: *Russian forests, carbon sink, carbon balance assessment, net ecosystem production (NEP).*

DISAPPEARANCE OF NICOSULFURON RESIDUES IN SOIL UNDER LABORATORY CONDITIONS

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Abstract

Sulfunyluares (SUs) present a new generation of herbicides which selectively control broad- and narrow-leaved weeds. Nonetheless, heightened utilization of SUs leads to increased concern about herbicides residues as the consequence of their prolonged persistence in some soils. Nicosulfuron belongs to the group of SUs herbicide. A laboratory experiment at termostat (temperature of 25^0C) was carried out to evaluate the effect of temperature on the dissipation dynamics and final residues of nicosulfuron in soil type Calcic Chernozem Clayic, Pachic. The dissipation of nicosulfuron in soil was described by using the Mittag-Leffler function $c\ E_a\ (-bt)$. Model coefficients *a, b, c* were obtained from the experimental data. The residues of nicosulfuron were determined by ultra-performance liquid chromatography with diode array detection in the ultraviolet region. In order to investigate dissipation, selected herbicide was applied as aqueous solution of commercial formulation nicosulfuron (Kelvin®, 40 g L^{-1}). The starting concentrations of nicosulfuron (measured in the samples soil taken on the 0th day, 2 hours after the treatment) on 25^0C were 389.84 μg kg^{-1}, 595.18 μg kg^{-1}, 649.02 μg $kg^{-1}$and 797.69 μg kg^{-1} after the treatment with 40 grams active ingredient (a.i.) per hectare of nicosulfuron (g a.i. ha^{-1}), 50 g a.i. ha^{-1}, 80 g a.i. ha^{-1} and 100 g a.i. ha^{-1}, respectively. After two days, residues of nicosulfuron were lower more than 86% compared with the initial concentration. Fifty days after the application of all doses the content of residues were below the LOQ for nicosulfuron (3.16 μg kg^{-1}). The obtained half-time degradation (DT_{50}) values of nicosulfuron were in range of 0.34 d (80 g a.i. ha^{-1}) to 0.68 d (40 g a.i. ha^{-1}). Significantly greater dissipation of nicosulfuron observed in this laboratory testing was influenced, most probably, by abiotic and biotic processes. Nicosulfuron poses low risks to the ecosystem in similar type soil because of their rapid dissipation.

Key words: *HPLC-UV-DAD, soil, sulfonylurea herbicide, dissipation.*

Acknowledgments

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AGRO-ECOLOGICAL CONDITIONS OF FRUIT GROWING IN THE PEŠTER (PLATEAU) REGION

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Abstract

Pedological and land capability properties of soil in the Pešter plateau region (the Municipality of Tutin, Serbia), indicate that those are predominantly shallow, poorly fertile soils, rated with class 5 and above. By altitude and relief predisposition, agricultural land is extremely mountainous with the average altitude of approx 1000m. Fruit area takes 0.9% of the territory or 340 ha of the area, with plum dominating in the production structure and a tendency of planting raspberry.Analysis of agro-physical and agro-chemical properties of the soil planned for established fruit plantations show that the soils within the same area are significantly different and require different repair measures accordingly. Agro-physical properties indicate the classification of clay to light clay soil, with medium to high interval of cation exchange capacity (T). Degree of soil saturation with adsorbed bases (V%) corresponds to other parameters tested, with the highest values in the Pešter region, in the zone under peat fields from which the peat is utilized for commercial purposes (V 85.14 to 98.57%). Agro-chemical properties of the soil indicate the soil reaction range from acid to slightly acid, non-carbonic at 60-75% of the sampled surface depending on the depth of sampling and culture grown. A high (> 5%) and very high (> 8%) humus content is present in the surface horizon (0-30 cm) in about 75% of the tested surfaces. In most of the sampled localities a very low content of available phosphorus was recorded (<6 mgP_2O_5/100 g of soil) as well as the availability of easily accessible potassium (15-25 mg/100g of soil). For the cultivation of fruit species in these conditions, it is necessary to consider all environmental conditions and then select the type and variety (of the species for cultivation).

Keywords: *Agro-ecological conditions, Pešter plateau, Fruit growing.*

THE ROLE OF FOREST ECOSYSTEMS IN THE RISK MANAGEMENT OF TORRENTIAL FLOODS (THE GRDELICA GORGE IN SERBIA)

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Abstract

The effects of climate, heterogeneous geological composition, topography, aspect and the quality of forest ecosystems accompanied with adverse human activities brought about intensive erosion processes and frequent torrential floods in the Grdelica Gorge in Serbia. Severe erosion processes led to the loss of soil fertility, devastating effects of torrential flows, poverty of the local population and their migration from the mountain villages into the cities of Serbia. In the 1950's and 1960's, small-scale technical works (torrential dams and inlet structures) were carried out in the riverbeds, while most of the erosion control works were focused on afforestation and establishment of the perennial agricultural cover crop on the surface areas with lower slope inclinations. In order to prevent the development of gully erosion and create favorable conditions for the establishment and growth of seedlings, the conventional afforestation practice by means of dense pit planting was replaced with the construction of biotechnical structures (bench terraces, contour ditches, rustic dams on the slopes etc). These new practices significantly decreased the intensity of erosion and the frequency of torrential floods (Z_{mean} = 0.84 in 1955, Z_{mean} = 0.33 in 2016). The paper presents the results of a comparative analysis of the state of forest ecosystems, their share in the total area, population movement, the intensity of erosion and sediment yield in the 1960`s and today (the period before and the period after the biological works were carried out).

Keywords: *forest ecosystems, risk management, biotechnical structures, the Grdelica Gorge, Serbia.*

ASSESSMENT OF SOIL EROSION IN THE WEE OYA WATERSHED IN SRI LANKA

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Abstract

Human induced soil erosion is one of the most significant types of land degradation in the Wee Oya watershed in Sri Lanka. The high intensity of rainfall, steep slopes and inappropriate land use practices are strongly associated with soil erosion in the area. The prime aim of the study was to estimate soil erosion in the watershed and its seven sub watersheds using the Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST), Sediment Delivery Ratio (SDR) model. Furthermore, a comprehensive household questionnaire survey (n=30) was conducted to ascertain socio economic information such as farmer's age, gender, education level, extent of land and the degree of practicing soil conservation measures. Then, the multiple regression analysis was applied in order to determine the correlation of five variables in relation to the erosion rate. The results of the assessment disclosed that the present average rate of human induced soil erosion of the watershed is 167 t/ha/yr. Moreover, the most significant ($\rho<0.05$) socio-economic determinants of the soil erosion of the study area are farmer's age and family size. Furthermore, the study revealed that more than 50% of the farmers did not have substantial perception on the implication of the existing government policies in respect to human induced soil erosion. Finally, the outcome of the assessment has clearly highlighted the necessity of human intervention for effective soil and water conservation measures in the study area.

Key words : *Human induced soil erosion, InVEST, Soil conservation, SDR*

IMPROVING WATER PRODUCTIVITY WITH DEFICIT IRRIGATION: IMPLICATIONS FOR WATER-SAVING IN ORANGE, OLIVE AND VINEYARD ORCHARDS IN THE ARID CONDITIONS OF TUNISIA

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Abstract

The field experiments on deficit irrigation (DI) were performed in Médenine, Tunisia, on drip-irrigated olive, orange and grapevine orchards during 2013 and 2014. Four irrigation treatments were compared: full irrigation (FI), at 100% of ETc for the whole season; two deficit irrigation (DI) strategies DI75 and DI50 in which plants received 25 and 50% less water than in FI, respectively; and traditional farming management (FM) - with much less water input than it was actually needed. The traditional farming (FM) used 11, 18, 30 and 33% less water (respectively) than the FI treatment, in orange, grapevine and table and oil olive orchards, indicating that farmer practices are a form of unintended deficit irrigation. The yields were reduced when deficit irrigation was applied and there were some significant differences between the DI75, DI50 and FM treatments. No significant differences were recorded between DI50 and FM treatments, even though DI50 treatment resulted in lower yields than the FM treatment. The irrigation water productivity (IWP) was significantly affected by irrigation treatments. The smallest IWP was recorded under the FI treatment, while the largest IWP was obtained under the deficit irrigation treatment (DI50). The DI50 and FM treatments reduced the economic return, compared to the full treatment (FI), while the DI75 treatment resulted in a better economic return in respect of DI50 and FM. Full irrigation (FI) could be recommended for olive, orange and grapevine irrigation in the arid climate of Tunisia. Nevertheless, the treatment DI75 can be applied as a strategy for conditions of water scarcity in commercial olive, orange and grapevine orchards, allowing up to 25% of water savings but resulting in reduction decrease in yields and net return. The results would be helpful in adopting deficit irrigation in ways that enhance net financial returns.

Key words: *water productivity, deficit irrigation, drip irrigation, orchards.*

IMPORTANCE OF RAINWATER HARVESTING PRACTICES ON WATER STORAGE IN DRY AREAS IN SOUTH-EAST OF TURKEY

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Abstract

Water is an important natural resource in arid areas. The rainfall is usually lost from the surface like runoff and evaporation in these regions. Gathered rainwater is used for agricultural production in arid region. Water harvesting is an old tradition in many countries in the world and water harvesting techniques are used for thousand years. It was developed in order to obtain drinking and domestic water for people. Water harvesting systems in semi-arid areas feed from precipitation and it supplies enough water for human life. Water harvesting is the best way to increase the amount of water per unit of cultivated area. It is reduce impact of drought and surface flow. Water harvesting systems help to reduce environmental damage, increase of plant vegetation and prevent to soil and water erosion. Some strong runoff which is caused erosion therefore these must be stored in the soil profile by water harvesting practices. Sloping land is available for water and soil erosion in semi-arid climate. This study explained that on the importance of rainwater harvesting on soil moisture and conservation. Rainwater is one of the natural resources when collecting insufficient water in the soil for agricultural cultivation.Water harvesting techniques help to local farmers and also to take advantage in terms of alternative irrigation for pistachio orchards in dry agricultural areas in Souteastern Anatolia Rgion in Turkey.

Keywords: *Dry areas, Soil conservation, Water conservation, Water harvesting.*

MATHEMATICAL MODELLING OF SOIL THERMAL PROPERTIES UNDER DIFFERENT PLANT CANOPIES

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Abstract

Soil thermal properties have a significant control on soil processes and plant growth. This study was conducted to model diurnal and seasonal change of soil temperature in soil profiles under corn, sugar beets, and no crops in Cumra township of Konya (dry-sub humid/semiarid continental central Anatolian climate). Soil temperature was modeled at 0, 5, 10, 20, 30, 40, and 60 cm soil depths with layers, point1, and point2 methods. The point1 and point2 methods gave similar results compared to that given by the layer method and the point1 and point2 methods outperformed the layer method in all the cases. The layer method predicted soil temperature in the majority of the cases. The success of all three methods to predict soil temperature decreased consistently with depth. This decrease was more drastic beyond dumping depth. Diurnal and seasonal soil temperature changes across the soil depths under corn were highly different from those of sugar beets and bare soils. Irrigation had a drastic influence on soil heat diffusivity and diurnal change of soil temperature in the studied soil depths. The results suggested that that the analytical solution and initial conditions used in the models were important factors for determining the performance of the modeling. In this regard, the point2 method can be preferred to the point1 and layer methods in modeling soil thermal properties. The results further showed that predications made in bare soil conditions cannot be applicable to cropped soils and that different canopies may affect soil thermal properties differently, due to differences in the canopy structure and in plant influence on soil water.

Key words: *Soil Thermal Properties, Mathematical Modelling, Plant Canopies, Heat diffusivity, heat conductivity,*

COMPOSITION AND STRUCTURE OF PARASITE COMMUNITIES IN WHITE BREAM *BLICCA BJOERKNA* FROM LAKE BÜYÜK AKGÖL, SAKARYA-TURKEY

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Abstract

No data on the parasites of *Blicca bjoerkna* have been reported to date from Lake Büyük Akgöl (Turkey). *Therefore, the aim of* the current study was to investigate the composition and diversity of parasite component and infra-communities in this cyprinid fish from hypereutrophic Lake Büyük Akgöl. A total of 61 *B. bjoerkna* were examined between December 2015 and November 2016. All fishes were hosts to at least one parasite species from the following taxa: *Trichodina* sp., *Epistylis* sp. (Protozoa); *Myxobolus* sp. (Myxozoa); *Dactylogyrus sphyrna*, *D. cornu*, *D.cornoides*, *D. distinguendus* and *Paradiplozoon homoion* (Monogenea); *Caryophyllaeus laticeps* and Cestod gen. sp. (Cestoidea); *Diplostomum* spp., *Thylodelphys clavata* and *Posthodiplostomum cuticola* (Digenea); *Piscicola geometra* (Hirudinea); *Glochidium* sp. (Mollusca) and *Argulus foliaceus* (Crustacea). Dominant species in the component communities were *D. cornoides*, *Diplostomum* spp., and *D. cornu*. Totally 2063 parasite individuals were collected. The highest dominance index of the parasites was recorded for *D. cornoides* (23.0%), and the lowest for *A. foliaceus* (0.1%). Parasite infracommunities of *B. bjoerkna* infected 1-10 species and the mean species richness was found as 5.3. The mean species richness was higher in female 5.8 and higher length class 6.2 fishes. The mean metazoan parasite diversity (Shannon's H index) was 2.08 and the Shannon-Wiener Evenness (E) had a mean value of 0.81. The results indicated that the parasite fauna consisted mostly of monogenean and digenean parasites. Identified parasite species in *B. bjoerkna* were the first records from Lake Büyük Akgöl.

Key Words: *Parasite communities, Blicca bjoerkna, Lake Büyük Akgöl, Turkey.*

HEAVY METAL CONTENTS OF SOME WILDPLANTS AND SERPENTINE SOILSIN KIZILDAĞ (ISPARTA), TURKEY

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Abstract

In this study, the concentrations of cobalt (Co), chromium (Cr), copper (Cu), iron (Fe), manganese (Mn), molybdenum (Mo), nickel (Ni), and zinc (Zn) were assessed in serpentine soils and 10 wild plants growing naturally in serpentine soils in Kızıldağ National Park (Isparta). The paper discusses the transfer of metals from serpentine soils to plants (MTF). The soils were of low concentrations in the nutrients of K, P and Ca, but high in Mg, especially in the slopping sides. The serpentine soils contain low Ca/Mg quotient (0.162-0.378) on the sloping areas where water erosion occurred. The soil samples from less inclined areas contain high Cu, Zn, Ca/Mg quotients (2.163-2.211) and organic matter, but low Co, Cr and Fe. The mean total heavy metal contents of soil samples decreased in the order of Fe>Ni>Mn>Cr>Zn>Co>Cu>Mo. Among the plants, Ni concentrations were the highest in *Noccaea camlikensis* (4472 mg/kg) and *Alyssum peltarioides* (3209 mg/kg) from Brassicaceae family. There was a correlation between Ca and Ni contents of these endemic Ni hyper accumulators. *A. peltarioides* and *N. camlikensis* may be used for phytomining of Nickel throughout serpentine soils and other polluted soils by Ni. In addition, after harvesting these Ni hyper accumulator plants can be used as compost for remediation of Ni deficient topsoils in agricultural area.

Key words: *Heavy metal, Wild plants, Serpentine soil, Kizildağ, Turkey*.

THE USE OF SOME WASTES IN *PRIMULA VULGARIS* CULTIVATION

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Abstract

The population growth, migration from rural to urban areas, industrial developments increase the number and amount of waste day after day. Wastes can be reused in different areas like agricultural and industrial areas. This study was carried out to determine the usage chances of some wastes such as sawdust, coconut fiber, hazelnut husk and sewage sludge in *Primula vulgaris* cultivation between January and April, 2017. *Primula vulgaris* plants were cultivated in growing media such as 50 % coconut fiber + 50 % soil (S1), 50 % sewage sludge + 50 % soil (S2), 25 % sewage sludge + 75 % soil (S3), 25 % sawdust + 75 % soil (S4), 50 % sawdust + 50 % soil (S5), 25 % hazelnut husk + 75 % soil (S6) and 50 % hazelnut husk + 50 % soil (S7). The study was designed as a randomized plot design with 3 replications and 6 plants were used in each plot. Leaf number, leaf length, plant diameter, number of flowers, flower diameter, E.C. and pH of drainage water were measured as parameters every four weeks. These parameters were analyzed statistically by analysis of variance, Duncan's multiple comparison test and Pearson correlation with SPSS 23 software. Plant height were best value in S1 (11.22 cm), S4 (10.28 cm), S5 (9.94 cm), S6 (10.50 cm) and S7 (11.56 cm) within 4 weeks and best values in a term of number of flowers were obtained from S1 (12.28), S3 (12.89), S5 (14.61), S6 (14.11) and S7 (13.67).

Keywords: *Primula vulgaris, Wastes, Substrate, Cultivation, Ornamental plants.*

ENERGY ANALYSIS OF WHEAT PRODUCTION AT THE GEOGRAPHICAL REGIONS OF TURKEY

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Abstract

This study is aimed to compare of the energy analysis of wheat production for some the geographical regions of Turkey. In this study, the five important indicators tor evaluate the energy analysis were considered as energy use efficiency, energy productivity, specific energy, net energy and energy profitability in wheat productions of the geographical regions of Turkey. The energy analysis data were obtained from different studies at the different geographical regions of Turkey such as East Anatolia (Erzurum), Marmara (Balıkesir-Edirne-Tekirdag), Mediterranean (Antalya and Cukurova), Black Sea (Tokat and Samsun) and Middle Anatolia (Konya and Aksaray), respectively. In result, the highest input/output ratio was obtained in East Anatolia region with 15.88 (irrigated) and 13.16 (rainfed), where as, the lowest energy use efficiency was obtained in Black Sea (Samsun) with 2.36 (irrigated), respectively. The highest specific energy was obtained in Black Sea (Samsun) with 8.96 MJ ha^{-1} (irrigated), while the lowest specific energywas obtained in East Anatolia region with 2.71 MJ ha^{-1} (irrigated), respectively. The highest and lowest net energy for wheat production were obtained in East Anatolia and Black Sea (Tokat) regions with 230374 MJ ha-1 (irrigated) and 21292,07 MJ ha^{-1} (rainfed), respectively. The highest and lowest energy profitability for wheat production were obtained in East Anatolia region with 14.88 (irrigated) and 12.16 (rainfed), and Black Sea (Samsun) with 1.36, respectively.

Keywords: *Energy use efficiency, wheat, Turkey, geographical regions.*

PHYSICAL AND SENSORIAL PROPERTIES OF CAKES PRODUCED BY UTILIZING CACAO BEAN HULLS

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Abstract

In this study, the physical and sensorial properties of cakes which are supplemented with raw and leached (hot water) grinded cacao bean hulls/flour in the ratios of 20/80 (20%), 30/70 (30%) and 40/60 (40%) were studied. Weight loss, cake height, moisture, specific volume, texture, and color were measured as physical analysis. Also sensory analysis of flour substituted cake formulations was evaluated. Cake height values were found to be in the range of 8.50-7.53 cm. Cakes which was added raw cacao bean hull (RCBH) showed more cake height values than cakes which was added leached cacao bean hull. The lowest value in weight loss was found to be 20% RCBH replacement of cake formulation as 5.95% while the highest weight loss was found to be 40% LCBH replacement of cake formulation as 6.93%. Specific volumes were ranged between 2.11 and 1.99 (cm^3/g) and no significant difference was found ($p<0.05$). The texture of the flour substituted cake samples showed higher values on hardness; lower values on springiness and cohesiveness than those of the control sample. While RCBH samples were found lower chewiness than control cakes, LCBH samples showed higher chewiness than control cakes. Flour substituted cakes were measured less moisture than control sample. Regarding crumb and crust color, significant differences were found for all samples ($p<0.05$). 40% LCBH and RCBH samples presented lowest L*, a* and b* values for both crust and crumb color. Cakes were measured in terms of cake color, cell uniformity, hardness, oiliness, moistness, fibrousness, chocolate taste, bitterness, odor and sweetness via 0-7 line scale as sensory analysis. Results showed that cell uniformity, hardness (by hand), addhesiveness, cacao taste, bitterness values of cakes which were produced by LCBH decreased by comparison with cakes which were produced by RCBH.

Keywords: *cacao bean hulls, flour substitute, cake formulation, texture, sensory analysis.*

SOME MEASURING METHODS OF PERCENT CROP RESIDUE COVER

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Abstract

The portion of the crop left in the field after harvesting is defined as crop residue. Incorporating crop residues leaves the soil surface exposed to soil erosion. Crop residue management is one of the most efficient methods to control soil erosion. Leaving crop residue on the soil surface before and during planting provides very good cover for the soil. Soil erosion can be greatly reduced by maintaining a crop residue cover on the soil surface at least 15-30% after all tillage and planting operations. Researches show that using crop residues to protect the soil surface from rainfall can reduce water erosion by 90%. Crop residues improve soil tilth and add organic matter to the soil. The crop residues decrease the rate of runoff, allowing more time for water infiltration into the soil. Also, the number of tillage passes is decreased to leave crop residues on the soil surface and soil compaction can be decreased. At the same time, fewer tillage operations provide time, energy and labour savings. For these reasons, measuring or estimating crop residue cover is very important for crop residue management and usefulness in terms of soil erosion control. The percentage of soil surface covered with crop residue can be measured or estimated using different methods. The main objective of this paper is to explain methods used for estimating or measuring crop residue cover. These consist of line transect, meter stick, photo comparison, calculation methods, and image processing.

Keywords: *Crop residue cover, Line transect, Meter stick, Photo comparison, Image processing, Crop residue management.*

DEVELOPMENT A PREDICTION MODEL OF SPECIFIC ENERGY REQUIREMENT FOR MOULDBOARD PLOUGH

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Abstract

Soil tillage is one of the most important operations in crop production. The mouldboard ploughs are the most common primary tillage implement in agriculture and widely used for conventional tillage all over the world. However, mouldboard ploughsare one of the highest energy consuming primary tillage implements. Many studies have been conducted to compare the draught and energy requirement of different types of mouldboard ploughs as well as the other tillage implement under various conditions.In some studies, mathematical models have been developed to predict draught, power and energy requirement of mouldboard ploughs. The energy requirement of mouldboard ploughs is affected by many factors, such as working depth, working witdh, the type and shape of plough body, the sharpness of the share, the overall adjustment of the plough, forward speed, soil type and soil parameters consisted of moisture content, bulk density and cone index. Prediction of the specific energy requirement for mouldboard ploughs could be useful in terms of proper selection of tractors and ploughs, working at optimum operating conditions and increasing field capacity. Thus, energy inputs and costs for tillage operation could be minimized. The objective of the present study was to develop a prediction model for the specific energy requirement of mouldboard ploughs working on a medium heavy soil condition in Turkey. The prediction model was developed based on dependent variables such as soil parameters including cone index, bulk density and moisture content, working witdh, working depth, forward speed and field capacity. The study showed that the specific energy requirement of mouldboard ploughs could be successfully predicted by the model with good accuracy. The regression coefficients of relationship between predicted and measured specific energy requirementof mouldboard ploughs were varied from 0.92 to 0.99.

Keywords: *Mouldboard plough, soil tillage, specific energy requirement, prediction model.*

EVALUATION OF VARIOUS SOIL TILLAGE METHODS IN TERMS OF PERCENT CROP RESIDUE COVER AND EROSION CONTROL

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Abstract

The aim of this study was to estimate the percent crop residue cover remaining on the soil surface after field operations with various soil tillage methods on wheat, barley, oats and rye fields and evaluate these methods in terms of soil erosion control. Tillage methods were mainly formed as fall tillage, fallow and spring tillage. Six tillage implements including mouldboard plough, disc plough, rotary tiller, one-way disc plough, chisel plough with sweeps and paraplough were selected for fall tillage and three tillage implements including heavy disc harrow, light disc harrow and harrow with spike tooth were selected for spring tillage. Totally, 42 of soil tillage methods were formed using these implements. The percent crop residue cover before tillage were determined by using a regression equation which gives the relationship between the amount of crop residue (kg ha^{-1}) and the percent crop residue cover. The percent crop residue cover after tillage operation was predicted by using calculation method. Tillage methods providing more than 20% of crop residue cover were accepted as sufficient for soil erosion control. Research results showed that percent crop residue cover remaining on the soil surface after tillage operation is ≤ 21.99% for method 11-16, ≤ 42.51% for method 21-26, between 14.64% to 59.07% for method 31-36, between 18.59% to 63.02% for method 41-46, between 40.90% to 85.33% for method 51-56, between 42.59% to 87.03% for method 61-66 and between 45.71% to 90.14% for method 71-76. Method 11-16 used on barley field, method 11-13 used on wheat field and method 11-12 used on rye field were evaluated as the most unsuccessful methods, whereas method 76 used on oats field was evaluated as the most successful method in terms of soil erosion control.

Keywords: *Percent crop residue cover, Calculation method, Soil tillage methods, Erosion.*

METHODS AND PRACTICES TO REDUCE SPRAY DRIFT FOR BOOM SPRAYERS

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Abstract

Spray drift is defined as the movement of spray droplets to a site other than the intended target area. The spray droplets can be moved during or after spray application. Spray drift is a serious concern because the pesticides are more active and non-selective and a small amount of pesticides can cause damage to nontarget plants and animals that are susceptible to the pesticide. Spray drift results in a waste of pesticide, reduces the effectiveness of spray application, and contaminates water supplies. There are several factors affecting the amount of spray drift. They include: spray droplet size, droplet release height, droplet release velocity, climatic conditions at the time of application (wind speed and direction, air temperature, relative humidity, and atmospheric stability), volatility and viscosity of pesticide formulation, equipment and application techniques, and operator care and skill. The elimination of spray drift is impossible, but, it can be reduced to a minimum level if pesticides are applied with the proper selection and operation of equipment at favorable weather conditions. Many drift control methods and practices are available for boom sprayers. The aim of this review paper is to explain factors affecting the amount of spray drift and give information including methods and practices to reduce spray drift.

Keywords: *Spray drift, Pesticide, Factors affecting spray drift, Drift control methods and practices, Boom sprayers.*

IMPORTANCE OF IRRIGATION AND SOIL PROCESSING FOR GRAPEWINE CULTIVATION YIELD

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Abstract

Turkey has ecological and extended vineyard areas for agricultural production. Many varieties and types of grapevines have been cultivated in our country. Aegean region is one of the important regions with intensive vineyard cultivation. Generally, without irrigation vineyard cultivation/production is done in Aegean region which has different ecological conditions for grapewine cultivation. Wild irrigation methods are more commonly used for irrigation. Effect of irrigation on yield is more important in relation to drought in winter and summer seasons regarding quality and also quantitative production. According to the researches, amount of irrigation water ranges between 110 mm and 120 mm for one application of irrigation which average amount in Aegean region. Deficit humidity in the root depth of grapevine is completed artificially by means of irrigation and usable humidity capture for more suitable level in the soil. Soil processing after irrigation effect on the yield has been positive. In this study, effects of capacity of soil humidity and soil processing on the grapewine yield and applied irrigation methods were explained for grapewine cultivation in Aegean region, Turkey.

Keywords: *Capacity of humidity, Evapotranspiration, Grapewine, Irrigation method, Irrigation period, Soil process.*

Acknowledgement

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SATURATED HYDRAULIC CONDUCTIVITY OF ANATOLIAN SOILS

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Abstract

Hydraulic conductivity is an essential base for applied research in soil and water management, landscape, and environmental disciplines. Saturated hydraulic conductivity (K_s) is one of the most important soil physical properties, which is considered in planning of irrigation and drainage and predicting other soil hydrological processes. However, it has been frequently reported that measurement of K_s is laborious, time-consuming, and expensive due to its high spatial variability and this has motivated researchers to develop indirect methods such as pedotransfer functions (PTFs) for developing K_s-database in regional and national scales. In this study, we reviewed studies for K_s conducted on Anatolian soils. PTFs were reviewed regarding their type, predictors used, and their performance. The majority of studied PTFs were developed on alluvial, collivial, and alkaline soils in semi-arid and semi-humid climates. Multiple linear regression, continuous and class PTFs, and neural networks have been common PTFs, and soil texture, bulk density, organic matter content, pH, and EC have been common predictors used with these PTFs. Root mean squared error, mean absolute error, and coefficient of determination were the commonly used criteria used in verification and validation of the PTFs. Studies conducted on K_s are inadequate and research is still needed to develop an adequate database for nationwide use.

Keywords: *Hydraulic conductivity, PTF, Resourse management, Turkish soils*

RELATIONSHIP BETWEEN SOIL WATER POTENTIAL AND SORPTIVITY IN A CLAY SOIL

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Abstract

Sorptivity (S) is the most important variable affecting the early infiltration process and is influenced by several soil properties such as texture, structure, porosisty, and initial water content of the soils. Information on interactions between S and soil varibles can help develop strategies for water and soil conservation since sorptivity is an important process that controls overflow deu to its decisive effect on early infiltration. In addition, determination of relations between sorptivity and soil water content is important to understand response of unsaturated soils to heavy rainfall. Numerous studies have been conducted for analyzing relations between soil water content and S, and many mathematical models were used to predict sorptivity, especially on dry soils, while studies on soil water potential-*S* relations are occasional. This study was conducted to evaluate functional relations between soil water potential and *S* in a clay soil. Seventeen undisturbed soil samples (5 cm id, 5 cm length) were collected from the topsoil (0-15 cm) of a paddy soils with clay texture. Sorptivity was measured with a mini disc infiltrometer on the soil samples equilibrated to different soil water potentials, ranging from 20 to 1500 kPa, using a pressure plate aparatus. In general, decreased soil water potential resulted in increased *S* down to -100 KPa, while further decreases resulted in decreased values of *S*. The results may explain reasons behind insidences of sudden overflows by heavy rainfalls following a dry period. Research is needed to evalaute soil water potential-S relations on different soils for generalizing the results.

Keywords: *Sorptivity, cumulative infiltration, soil water content, soil water potential*.

THE EVALUATION OF GENETIC DIVERSITY IN ORCHARDGRASS (*DACTYLIS GLOMERATA* L.) POPULATIONS

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Abstract

Dactylis glomerata is a perennial forage grass, widely found in many regions of the world. Turkey is a rich country in terms of wild *Dactylis glomerata* populations. This study was conducted in order to determine the genetic diversity of *Dactylis glomerata* populations. Fourteen Simple Sequence Repeats (SSR) molecular markers were used to estimate genetic diversity in eleven populations of Dactylis glomerata collected in five different geographical locations in Turkey. In the study, sixty six alleles were detected. The mean number of alleles per locus was 4.71 and it was ranged between 2 and 12. In the study, all SSR loci were determined as polymorphic. The Polymorphism Information Content (PIC) values ranged between 0.322-0.921. A dendrogram was constructed in order to determine genetic cluster, Unweighted Pair Group Method with Arithmetic Mean (UPGMA) clusters based on average Nei's genetic identity divided eleven accessions into four groups. According to results, the population materials from the same region were in the same group thus showing a geographical distribution of genetic diversity of the populations. The geographical conditions such as climate and soil, genetic drift and mating system could be the crucial factors for genetic diversity. As a consequence of the study, it was observed that the region have enough diversity to provide the necessary material in forage pea breeding studies.

Keywords: *Microsatellit, polymorphism, genetic difference.*

COMPARISON OF FOUR SPATIAL INTERPOLATION METHODS FOR SOME SOIL PROPERTIES IN CORN-GROWING AREAS

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Abstract

In this study, spatial distribution maps of some soil properties were prepared by using different interpolation methods. For map preparation, one should first determine a method that gives the most accurate spatial distribution. The soil samples were taken from 30 different points at 0-30 cm and 30-60 cm depth in corn-growing areas. Soil properties, such as electrical conductivity, clay and silt values, were determined. In order to determine the most appropriate interpolation method, four interpolation methods were compared, such as inverse distance weight (IDW), radial basic function, ordinary kriging (O.K.), and simple kriging (S.K.). Then the soil maps were prepared, by chosing the optimal method. The performance of four interpolation methods was evaluated with cross validation, and root mean square error (RMSE) was used to determine the best method. In 0-30 cm of soil depth, the SK method had the lowest RMSE for EC, whereas clay was best estimated by using the OK method. RBF was found to be the optimal method for sand. In 30-60 cm of soil depth, the IDW method was proved to be the best for EC, whereas the RBF method was the most accurate for clay and sand. It was found that there were no salinity problems in the study area, and the salinity was higher at 30-60 cm of soil depth. In most of the studied area, the soil was sandy and needed frequent irrigation. Spatial distribution maps should be prepared in precision agriculture and redemption of soil after determining the best interpolation method.

Key words: *Geographic information methods, Salinity, Interpolation methods, Ordinary kriging*

BALANCED SOIL FERTILITY AS THE ROOT OF SUSTAINABLE ORANGE PLANTATION OF CAO PHONG DISTRICT, HOA BINH PROVINCE, VIETNAM

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Abstract

Sustainable agriculture has been a world trend in crop production, which is raising a special concern in developing country such as Vietnam. However, the change of land use from forest to citrus garden (mainly orange) with the overuse of fertilizers (nitrogen, phosphorus, potasium) and herbicides, copper fungicides with other chemicals lead to severe soil degradation (soil acidification, nutrient imbalance, copper contamination, appearance of more plant parasitic nematodes). We hypothesized that i) microbial biomass decrease from forest soil to citrus garden due to soil degradation; ii) enzyme activities in citrus garden related to C-, N-, P- cycles are less than in forest soil as a result of soil acidification and pollution as well as excessive use of fertilizers. We measured soil chemical and biochemical properties, for example, soil pH, P and S availability, microbial biomass and enzyme kinetics (cellobiohydrolase, β-glucosidase, xylanase, chitinase, leucine aminopeptidase and acid phosphatase) in different soil depths associated with various land uses in order to test our hypotheses. The results demonstrated that the more aged the gardens the lower the soil pH, and soil pH in the garden was much lower than in the forest. Total P and S were high in all soil samples, but mainly presented in precipitated forms which are hard for citrus trees to uptake. Microbial biomass and enzyme activities sharply reduced in soil after excessive application of fertilizers and herbicides. The differences in microbial activities were larger in topsoil among land uses than in subsoil where fertilizers poorly reached more than 50 cm soil depth. We conclude that management of balanced soil fertility should be considered in sustainable agriculture implementation, especially in the slope topography.

Keywords: *Sustainable agriculture, citrus garden, land use, soil fertility.*

SOURCES OF HEAVY METALS AND THEIR INFLUENCE ON THE SOIL

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Abstract

Soil represents a very complex and sensitive component of the environment that could easily be compromised by irrational exploitation, industrialization, mining operations, erosion and various other activities. Soil pollution is a globally growing problem, while among numerous resistant pollutants, heavy metals are the most dangerous. This group of pollutants is considered the most significant cause of degradation the soil quality, surface and underground waters as well as an immediate cause of the harmful impact on the living world. Although heavy metals are naturally present in the soil in low concentrations, and some of them are even essential for the living world, anthropogenic activities may lead to increase of their concentration above allowed limits, which produces numerous unwanted impacts. When it comes to negative characteristics of heavy metals, it is significant to emphasize durability, toxicity, carcinogenicity, and inclusion in the food chain. The most important anthropogenic sources of heavy metals in the soil are wastewater from some industrial processes (production of metals and alloys, electroplating, production of batteries), mining activities, burning of fossil fuels, municipal waste waters, incineration and disposal of waste, sludge stemming from waste water treatment, fertilizer and pesticides usage in agriculture, military activities. The most significant heavy metals present in the soil as a consequence of these activities, are: Cu, Zn, Pb, Ni, Cd, Hg, As. In order to determine the impact of these pollutants on the environment and human health, it is necessary to determine their concentrations and form in the soil. Generally speaking, only mobile fractions are dangerous. From the health and ecological aspects, knowing the mobility of heavy metals is of great importance. This study addresses the impact of anthropogenic activities on soil contamination with heavy metals, the form in which they are present, and the negative effects caused by their presence.

Keywords: *Pollution of soil, Heavy metals, Mobility, Speciation, Effects.*

COMPARISION OF MULTIVARIATE CALIBRATION METHODS FOR PREDICTING SOIL ORGANIC CARBON WITH VIS-NIR SPECTROSCOPY

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Abstract

This study aimed to compare four different regression methods, including partial least squares regression (PLSR), principal component regression (PCR), boosted regression trees (BRT) and support vector machines regression (SVMR) for predicting organic carbon content in soil samples with visible-infrared (Vis-NIR) diffuse reflectance spectroscopy (DRS). The reflectance spectra of a total of 238 topsoils (0-25 cm) heterogeneous samples were measured in a laboratory using a portable Terra Spec 4 Hi-Res Mineral Spectrometer with a wavelength range of 350-2500 nm. The analysed soils belong to various soil types used in agricultural production with SOC content ranging from 0.29 to 37.50 g C kg^{-1}. The estimation accuracy was determined with the coefficient of determination (R^2), the ratio of performance to deviation (RPD) and the root mean square error of prediction (RMSEP). The results of this study showed that the SVMR and the PLSR models obtained good predictions for soil organic carbon with R^2 values of 0.87 and 0.86, RMSEP 2.48 and 2.58 g C kg^{-1} and RPD values of 2.5 and 2.4, respectively. The PCR and BRT showed a noticeable decrease in prediction accuracy with R^2 values of 0.77 and 0.72, RMSEP 3.49 and 3.71 g C kg^{-1} and RPD values of 1.6 and 1.5, respectively indicating fair predictions. Our study confirmed the potential of Vis-NIR spectroscopy for estimation of SOC content and showed that the estimation accuracy of the analysed calibration methods decreased in the following order: SVMR>PLSR>PCR>BRT.

Key words: *BRT, Chemometrics, PCR, PLSR, SVMR*

MODELLING OF METEOROLOGICAL PARAMETERS FOR THE PURPOSE OF SIZING OF THE SOLAR PHOTOVOLTAIC IRRIGATION SYSTEMS

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Abstract

Solar photovoltaic (PV) irrigation systems are usually sized by using measured or modelled meteorological data, such as solar radiation, air temperature and precipitation during a year or a certain period. Experiences during sizing, as well as in the use of such systems, have shown certain discrepancies during the year, despite the available data such as annual cloud coverage, number of sunny days, etc. In such cases, the usual statistical parameters as well as trend analysis are not reliable tools for predicting deviations of the PV irrigation system operation. The justification of using the Rescaled Adjusted Partial Sums (RAPS) method has been researched in his paper, in order to determine the existence of such deviations in the given time series (i.e. their deviations or fluctuations) of the solar radiation intensity, air temperature and precipitation. In this way the existence of certain irregularities of the given time series, i.e. input quantities of solar radiation intensity, air temperature and precipitation amounts were determined. This defined the period of the year in which special attention had to be paid to the operational functioning of the PV irrigation systems. The presented methodology was shown on real examples on several locations in the Republic of Croatia where PV irrigation systems are planned to be built. This methodology will certainly contribute to the achieving of systematic sustainability of the PV irrigation systems.

Keywords: *Meteorological parameters, RAPS method, Solar photovoltaic energy, Irrigation system, Time series*

UNLIMITED USE OF IRRIGATION WATER RESOURCES IN ARID AND SEMI-ARID REGIONS OF IRAN: NO-WIN COMPETITION

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Abstract

Water shortage as a virtually common feature is a major limitation for agricultural development, in Iran. Climate change is also expected to put extra pressure on Iran's water resources through making the region hotter and drier. These extreme environmental conditions require flexible and adaptive utilization of water resources. However, the average irrigation efficiency is low and the crop pattern, e.g. rice production, does not match the regional water availability conditions. Using qualitative research method in three rice growing villages of Firuzabad County, southwest Fars province, this study aims to identify the main causes of unlimited use of water resources in water scarce regions of Iran. Results indicated that Fars has experienced significant reduction in rice production since 2007. Some rice farmers have modified their cropping systems by growing drought resistance crops. However, some others are still cultivating irrigated rice which is causing the looming water crisis. Finding revealed that personal, financial, institutional, legal and regulatory issues and socio-psychological drivers have constrained sustainable use of scarce water resources. Recommendations are offered to increase the efficiency of water resources and modify cropping system in water scarce regions.

Keywords: *Agriculture, climate change, scarce water resources, rice producers, sustainable management*

PROMISING AMMONIA MITIGATION OPTIONS IN LATVIA'S AGRICULTURE

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Abstract

The revised Gothenburg protocol and EU National Emission Ceilings Directive establish ammonia emission reduction targets. Taking into account that the agricultural sector remains the major source of ammonia emissions in both EU and Latvia (86%), the huge effort should be made by agriculture sector to achieve ammonia mitigation. The aim of the paper is to provide the most promising ammonia emissions reduction and mitigation options in Latvia's agricultural production. Following tasks have been covered in the study: 1) to determine the main sources of ammonia emissions in the each of livestock species (dairy cattle, pigs, poultry) and farms' size; 2) to evaluate and to identify the most promising mitigation measures, taking into account the reduction potential, effectiveness and potential costs. The largest proportion of ammonia emission comes from the livestock production: 45.6% from manure management and 19.6% from manure application. The results show that the milk production, pig and poultry industry are the target branches of agricultural production. The most promising emission reduction and mitigation measures have been proposed, out of which the animal feeding strategy and manure application techniques are distinguished as the most effective.

Keywords: *Ammonia mitigation, agriculture, feed, manure, Latvia*

A QUALITATIVE METHOD FOR DETERMINATION OF NICOTINE IN LITTERED CIGARETTE BUTTS

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Abstract

Discarded cigarette butts are toxic, non-biodegradable, waste that create environmental health risks and an economic burden. It is estimated that 1.69 billion pounds of cigarette butts end up as toxic waste annually. In areas with substantial amounts of butts, environmental hazards may arise as nicotine and other chemicals, heavy metals, additives, pesticide residues are leached from the filters and tobacco. The aim of this study was to optimization of qualitative analysis of nicotine in discarded cigarette butts using chemical test (Dragendorff's reagent). Orange colored precipitation with Dragendorff's reagent indicated the presence of nicotine which was confirmed by gas chromatographic (GC-FID) method with liquid-liquid extraction of butts. Ten samples of most popular cigarette brands were selected to cover the low, medium and high range of nicotine yields had to be consistently smoked down to about 1 cm from cigarette filters. The nicotine content in smoked cigarette butts (CBs) with and without remnant tobacco was measured using Dragendorff's test and ISO 10315. Our results confirm the nicotine concentration of orange colored precipitation obtained with Dragendorff's reagent with nicotine concentration measured by GC-FID. The nicotine concentration in littered butts without remnant tobacco was range from 0.24 to 1.36 mg per butt and with remnant tobacco was higher about 20 to 25 %. An accurate analytical method for determining nicotine in littered cigarette butts (CBs) has been developed. This method is found to be low-cost, quick and valuable for analysis of moderate and significant levels of nicotine in cigarette butts (CBs).

Keywords: *cigarettes, butt, nicotine, environment, Dragendorff's reagent*

BIODIGESTER BALES: METHOD FOR THE ECOLOGICAL MANAGEMENT OF ORGANIC RESIDUES

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Abstract

The environmental and public health problems by inadequate management of organic waste continue to worsen in many parts of the world. The high rates of waste generation associated with deficiencies in collection and treatment services are a source of negative impacts; the inadequate disposition of the material bound to an incorrect separation causes proliferation of pest species, bad smells, toxic gases formation, fumes and dust that contribute to the contamination of the ecosystems. The cause of these problems that alter the quality of the environment and the health of the people is certainly of anthropic origin, because in nature, the recycling of nutrients is an essential function for life.In view of this scenario, it is proposed the implementation of an ecological method, alternative to traditional compost, which has been proven effective by developing it in higher education institutions and university. Among the benefits offered is the management of tons of organic material in small spaces, the sustainable use of waste derived from food consumed in schools, among others. Studies for the analysis and evaluation of the physicochemical and nutritional quality of the organic fertilizer obtained in different climatic conditions, from biodigester bales assembled in Medellín, Colombia and Texcoco, Mexico, showed favorable amounts of nutrients that benefit the growth of seedlings planted in the same bale or when applied as fertilizer in gardens and orchards. Therefore, the development of this proposal also benefits the urban and ecological agriculture areas.

Key words: *biodigester bale, organic fertilizer, sustainability, school.*

PLANT BENEFICIAL BACTERIAL STRAIN WITH PHC DECONTAMINATING POTENTIAL

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Abstract

Recent concerns regarding environmental safety have drawn attention to the risks of petroleum hydrocarbons (PHC) contaminants. These pollutants are highly toxic mostly because of their persistence in the environment, and long range of toxicological effects. Therefore, we considered that accidental PHC field contamination when using agricultural mechanical systems is an issue that should be suppressed. In these regard we focused on the isolation of potential PHC decontaminating microorganisms. The lignocellulosic fibers are known as good absorbents of PHC, and also they are abundant materials in agricultural lands. From such lignocellulosic fibers, we isolated several bacterial strains, one expressing PHC decontaminating abilities. The new isolated strain BBp1 revealed PHC emulsification ability and was able to disperse the diesel fuel. The BBp1 bacterial strain also showed several plant beneficial traits. The phosphate solubilizing activity of this strain could improve soil fertility, thus contributing in plant growth stimulation. Arginine metabolism revealed in this strain could improve the efficiency of plant nitrogen use, thus regulating plant developmental processes as well as plants response to biotic and abiotic stress. The selected strain can contribute to plant growth stimulation through phytohormones synthesis, as it produces 9.6µg IAA/ml in the culture supernatant (LB broth supplemented with 2.5mM tryptophan).

Keywords: *PHC, Bacterial strain, Emulsification, Plant growth stimulation.*

REPRODUCTION AND PROPAGATION OF SOME RARE SPECIES OF THE CRIMEAN FLORA

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Abstract

The problem of conservation of a biological diversity of the biosphere, including its plant component, is currently very relevant and this is especially important for rare and endangered species of plants. Such rare species, which have to be protected, grow in the Crimea are *Arbutus andrachne* L. (Ericaceae), *Pistacia mutica* Fisch et Mey. (Anacardiaceae), *Campanula talievii* Juz.(Campanulaceae), *Fumana thymifolia* (L.) Spachet Webb (Cistaceae) and *Glaucium flavum* Crantz. (Papaveraceae). As the result of the study of a reproductive biology of these species, the types of formation of their generative structures, especially antekology, seed formation and dissemination have been obtained. It is shown that the main limiting factors for an optimal development of the studied species in the conditions of a natural growth are the meteorological factors in critical phase of formation of generative structures, damage caused by large animals as well as an anthropogenic impact (plowing land, construction, industrial pollution, decoration flowers, etc.). However, conservation of the species for the most part provide: stability of formation of viable male and female generative structures; successful processes of pollination and fertilization as the results of a paired development of elements of a flower, structure of insect-pollinator and pollination mechanisms; features of a seed formation and dissemination. An autogamy and vegetative propagation can be considered as reserve means, contributing to the preservation of these species. Thus, the observed variety of tools for effective processes of reproduction of the studied species of plants indicate the potential and reliability of their systems for reproduction and resettlement, and identification of the causes of the decreasing numbers allow us to develop scientifically based methods and optimize the resumption of types (nature reserves, introduction to culture, repatriation, etc.).

Keywords: *rare species of plants, generative structures, antecology, seeds formation, dissemination.*

EFFECT OF SOME HERBICIDES ON CELLULOSE DECOMPOSITION IN THE SOIL

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Abstract

The effect of simazine (62, 125, 250 and 500 μg/g soil), paraquat (37, 75, 150 and 300 μg/g soil) and 2,4 D (87, 175, 350 and 700 μg/g soil) on cellulose decomposition in two soils (sandy soil and chernozem) was studied. Simazine and 2,4 D were mixed with soil and cellulose (2% powdered cellulose) before humidification, whereas paraquat was introduced into the soil along with water during humidification. The soil receiving no pesticide treatment was the control. The modelled soil samples were incubated in a thermostat at 28 ˚C for 12 weeks. The amount of water that vaporized was added to the soil on a weekly basis. Results showed that simazine rates had a slight inhibitory effect on cellulolytic activity in the tested soils. Only the highest rate of 2,4 D caused a considerable degree of inhibition of cellulose decomposition. Paraquat exhibited a higher level of toxicity compared to simazine and 2,4 D. As even the lowest application rates were several times greater than the rates commonly used in agricultural practice, the herbicides tested, when applied at recommended rates, cannot be inhibitory factors in cellulose transformation in these soils.

Key words: *herbicides, cellulolysis, soil, microorganisms*.

INFLUENCE OF FERTILIZATION AND LIMING ON CHANGES OF AGROCHEMICAL CHARACTERISTICS OF SOIL TYPE PSEUDOGLEY

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Abstract

The influence of long-term application (over 15 years) of different system of fertilization and liming (applied every 5 years) on the state of agrochemical characteristics of soil type pseudogley were investigated. The trial included an untreated control and three ameliorative fertilization treatments: NP_1K (120 kg N ha^{-1}, 80 kg P_2O_5 ha^{-1}, 53 kg K_2O ha^{-1}), NP_2K (120 kg N ha^{-1}, 160 kg P_2O_5 ha^{-1}, 53 kg K_2O ha^{-1}), NP_1K + $CaCO_3$ (120 kg N ha^{-1},80 kg P_2O_5 ha^{-1}, 53 kg K_2O ha^{-1} + 5 tha^{-1} $CaCO_3$), NP_1K + $CaCO_3$ + manure (120 kg N ha^{-1}, 80 kg P_2O_5 ha^{-1}, 53 kg K_2O ha^{-1} + 5 tha^{-1} $CaCO_3$ + 20 t manure ha^{-1}). This investigation carried out at the experimental field of Secondary Agricultural-chemical school "Dr Djordje Radic" in Kraljevo. The results of investigation showed a significant effect of long-term application of fertilizers and liming materials to changes in pH, content of N, P_2O_5, K_2O, Fe, Mn, Zn, Al, and partially indicated the composition of adsorption complex of soil and content of humus in soil. The long term application of NP_1K fertilizer every year in combination with periodical application NP_1K + $CaCO_3$ + manure every five year showed the highest eficient influence on changing the characteristics of pseudogley type of soil. Thus, combined application of NP_1K + $CaCO_3$ + manure reduced soil acidity ($pH_{(KCl)}$ for 1.8 units), the content of mobile Al (from 13 mg 100 g^{-1} to 0.4 mg 100 g^{-1}), and the content of Fe and Mn in several dozen mg kg^{-1}, and increased content of P_2O_5 by about 4.2 mg 100 g^{-1} and K_2O content by about 2.1 mg 100 g^{-1}.

Key words: *agrochemical properties, fertilization, liming, soil, pseudogley.*

PROSPECTS FOR USING SUDAN GRASS AS A SOURCE OF RENEWABLE ENERGY

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Abstract

For making solid or liquid biofuels, one can use whole plants of annual or perennial species, if they form large biomass per unit area suitable for commercial processing. A large number of plants worldwide in the vegetation season yield large biomass that can be used in different ways as a source of energy. During the two-year research (2014 and 2015), researchers studied morphological and productive characteristics of the Sudan grass variety *Zora* grown on chernozem, namely: leaf mass, stem mass and biomass yield. The results revealed that the biomass was, on average, higher in the second year than in the first. The biomass yield was statistically significantly higher in 2015 (40.47 t/ha) than in 2014 (36.64 t/ha). A statistically significant positive correlation was found between the leaf mass and the stem mass (0.63), while there was a statistically non-significant positive correlation between the leaf mass and the biomass yield (0.47), as well as between the stem mass and the biomass (0.28).

Key words: *agro-energy crops, biomass, genotype, morphological characteristics, Sudan grass.*

TWO CENTURIES OF LAND USE CHANGES INFLUENCED BY INTENSIVE MINING AND SMELTING ACTIVITIES (MIDDLE SPIS, SLOVAKIA)

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Abstract

Mining activities and mining related industries in the Middle Spis area (Slovakia) contributed significantly to the irreversible changes of landscape structure. Study aims to detect and analyse landscape changes in four former mining villages during four-time horizons. Total change of landscape structure for a period of over 200 years was detected using landscape matrix. Four land indices/coefficients (Shannon diversity index, the coefficient of ecological stability, the coefficient of anthropogenic pressure and the coefficient of landscape originality) were used in order to evaluate the landscape state at each time period. The most significant land use changes were identified between 1785 and 1986 when mining activity was the most extensive. Arable fields were occupied by transport, residential and technical units and the area of forests was reduced because of grasslands expansion. After 1986 processing plants were closed and mining activities reduced but landscape stayed disrupted by mining bodies. The values of indices and coefficient did not show positive trends even after the end of activities.

Keywords: *Former mining area, GIS, Land use indices, Landscape matrix, Historical maps.*

THERMOPHILIC BIOMETHANIZATION OF AGRICULTURAL WASTE IN CODIGESTION: EFFECT OF PESTICIDES

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Abstract

Anaerobic digestion (AD) is becoming one of the most feasible and efficient options for agro-industrial waste management. However, this kind of waste can contain certain substances from the industrial activity, which could potentially inhibit or, at least, modify the biomethanization process. Pesticides are widely used in agricultural activities. Mancozeb is an ethylene dithiocarbamate fungicide with broad spectrum used in crops. It reacts with and inactivates sulfhydryl groups of aminoacids and enzymes of fungal cells, disrupting of respiration, lipid metabolism and production of energy. Tefluthrin is a synthetic pyrethroid insecticide used to control a wide range of soil pests. It causes neurotoxicity and is a sodium channel modulator. This paper assesses the influence of the presence of mancozeb and tefluthrin on thermophilic (55°C) anaerobic co-digestion (carrot, cabbage, green pea, artichoke and fava and broad bean) of synthetic agroindustrial waste. The main results show that the pesticides improve the biomethanization process referred to generation of biogas (123%), consumption of volatile solid –VS- (18%), removal of chemical oxygen demand (5%) and yield of biogas measured like mL biogas/ VS consumed (117%), between other parameters. Anaerobic codigestion on presence of pesticides seems feasible and improved in comparison with the codigestion without these substances.

Keywords: *Agricultural waste, Co-digestion, Thermophilic, Pesticides.*

EFFECT OF NUTRIENTS ON BIOMETHANIZATION OF AGRICULTURAL WASTE: STUDY OF TEMPERATURES

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Abstract

Anaerobic codigestion has shown to be feasible to manage organic waste. Different wastes treated together can be the supplement of nutritional deficiencies for the microorganisms involved. In this study, the presence of macromolecules and trace elements on anaerobic codigestion of agricultural waste has been assessed. An extra nutrients solution containing elements, which play a key role in the anaerobic microbiological metabolism, was used at three different temperature conditions: mesophilic (35°C), intermediate (42°C) and thermophilic (55°C). The main results showed that at 35°C in the presence of nutrients, biogas production reached 6.2L, almost 1.5-fold the production of biogas without them. Additionally, productivity was 359.3mL-CH4 / g-VS, which is 1.9 times higher than that for the process without nutrients. At 42°C up to 55% of VS were eliminated and more than 10.0L-biogas were produced, while biomethanization without extra nutrients solution only reached 7.4L. The anaerobic codigestion at 55°C showed that biogas production also surpassed 10.2L in the presence of nutrients and 146.99mL-CH4 / g-VS were obtained, being these results 1.2-fold those obtained for the process without extra solution. Results for each temperature showed that the nutrients solution could contribute to the biomethanization process of codigestion waste. Furthermore, 35°C was the temperature range at which the impact of nutrients was more remarkable.

Keywords: *nutrients solution, anaerobic digestion, agricultural waste, temperature*

EVOLUTION OF SOME EDAPHIC PROPERTIES IN AN AGRICULTURAL SOIL AFTER ITS CHANGE OF USE - RAINFED TO IRRIGATED

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Abstract

This study aims to assess the influence of cropland use change (rainfed to irrigated) on some soil properties. To this effect, three profiles (P1, P2, P3) were sampled and analysed to determine macromorphology and electrical conductivity, as well as total organic carbon, total nitrogen, base cations (Na, K) and assimilable phosphorous and micronutrient (Fe, Mn, Cu, Zn) concentration. The profiles were located in the closest point of three different rainfed patches. Cropland use change occurred in 1998 for P2 and P3. Sampling of profiles took place in 2003 (P1 and P2) and 2015 (P3). Analytical results were submitted to one-way ANOVA, comparing the same horizons of the three profiles. Use change led to organic carbon enrichment (≈6 $g \cdot Kg^{-1}$ in P1; ≈10 $g \cdot Kg^{-1}$ in P3) and browning of the Ap horizons. As a result, the soil evolved from a Cambic Calcisol (P1, P2) to a Fluvic Calcic Kastanozem (P3). The highest concentration of phosphorous was measured in surface layers of P3 (37 $mg \cdot Kg^{-1}$), which might be linked to soil carbon enrichment; in contrast, a slight nitrogen-leaching process was detected in deep horizons (P2, P3), likely caused by nitrogen lixiviation and intense irrigation. EC values were doubled in P2 (2.3 $ds \cdot m^{-1}$), due to salinity of irrigation water, organic amendment and fertirrigation. Lower values of EC were measured in P3 (1.4 $ds \cdot m^{-1}$), as a result of a readjusted management. Potassium concentrations were higher in Ap horizons, especially in P2 (0.5 $g \cdot Kg^{-1}$); sodium concentration evolved similarly to EC; micronutrients accumulated in upper horizons similarly to potassium. Irrigation and fertilisation schedule have proved to be appropriate for the intensive management of the cropland, reducing soil salinisation and increasing soil fertility. Furthermore, crop rotation and addition of organic compost were key points to favour a carbon sequestration process in the soil, promoting a classification change to a more developed soil.

Keywords: *Change of use, salinisation, fertility, carbon sequestration, nitrogen, Spain.*

YIELD AND WATER PRODUCTIVITY RESPONSE OF QUINOA TO VARIOUS DEFICIT IRRIGATION STRATEGIES APPLIED WITH SURFACE AND SUBSURFACE DRIP SYSTEM

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Abstract

The field experiment aiming at the determination of optimal irrigation strategies for surface and subsurface drip irrigated quinoa under the Mediterranean climatic conditions in Turkey have been carried out at the experimental field of the Çukurova University, Adana, Turkey. Irrigation treatments considered were full irrigation (FI), regulated deficit irrigation (RDI), partial root-zone drying (PRD), deficit irrigation DI-75, DI-50 and rainfed (RF). Soil water deficit was replenished to field capacity when 50% of available water at 60 cm was depleted in FI. RDI received 50% of FI-100 until flowering growth stage, there upon received 100% of water requirement. PRD received 50 % of FI but irrigated alternately. Deficit irrigations DI-75 and DI-50 received 75 and 50 % of FI, respectively. The amount of irrigation applied to surface drip irrigation plots varied form 99 mm in DI-50 and PRD-50 to 149 mm in FI treatment; the corresponding values for subsurface drip plots varied from 95 to 140 mm. Crop water use (ET) values ranged from 169 mm in RF to 282 mm in FI in surface drip, and varied between 169 mm in RF and 271 mm in FI in subsurface drip plots. Quinoa under surface drip plots used slightly more water than subsurface drip pots for the same treatments. There was no significant difference in grain yields between the irrigation methods, however, irrigation treatments resulted in significantly different yields. FI, DI-75, PRD and RDI resulted in similar yields and significantly greater yields than DI-50 and RF. Although PRD and DI-50 treatments received the same amount of irrigation water, PRD resulted in higher yields than DI-50. Water productivity (WP) values decreased with increasing water stress, thus RF and DI-50, PRD treatments resulted in greater WUE as compared to FI, RDI, and DI-75.

Keywords: *Quinoa, deficit irrigation, regulated deficit irrigation, partial root-zone drying*

COMPREHENSIVE EVALUATION OF IRRIGATION SCHEMES: A CASE STUDY IN SEYHAN AND CEYHAN RIVER BASINS IN TURKEY

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Abstract

Çukurova which is characterized by the Mediterranean ecosystem is the most important plain in Turkey. About 10% of the agricultural proceeds of Turkey has been produced in the region and 5% from Seyhan and Ceyhan River Basins. This study was carried out in the Lower Seyhan and Ceyhan River Basins located in the Çukurova in southern of the Turkey. In this paper, the cumulative impact of existing irrigation projects in Seyhan and Ceyhan Basin was evaluated by considering technical, economic, social and training problems. Irrigation efficiencies were computed according to the amount of water diverted into the canals and crop evapotranspiration. Physical state of the irrigation infrastructure was examined. In order to determine judicial attitudes and behaviours of farmers related to irrigation, a survey was conducted with 253 farmers. The findings obtained and survey results showed that there were many problems related to irrigation efficiency, irrigation management, irrigation infrastructure, training and extension issues. Performance of irrigation practices, especially in the efficiency of water application is still too low, i.e. 41-44% in the catchment level. This is due to inadequate irrigation infrastructure and farmers lacking the management skills to manage their irrigation systems properly. As a result, the immediate improvement of the irrigation infrastructure are needed besides improvement the farmers' irrigation management skills.

Keywords: *irrigation management, irrigation infrastructure, irrigation efficiency, Lower Seyhan Plains, Lower Ceyhan Plains.*

GEOMORPHOLOGY AND WATER QUALITY OF THE COASTAL LAGOONS OF ALBANIA

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Abstract

Coastal lagoon ecosystems are typical habitats of the Mediterranean Region. The Albania coastline has a total length of about 380km, two third of which border the Adriatic Sea and one thirds the Ionian- Sea. This coastline is characterized by an extremely active sedimentary regime. The sediments discharged by the rivers Shkumbini, Semani and Vjosa have built up the coastal plain, where at present the two largest lagoons of Albania, Karavasta and Narta, are found. Karavasta lagoon (Ramsar site) is included on the most various mosaics of coastal habitats in Albania that extend between Shkumbini and Semani river, in the central part of the Albanian Adriatic coast. Karavasta Lagoon is included in Karavasta complex area with Godulla lagoon, and irrigation collectors of Myzeqe and Terbufi, Kulari area and Semani and Shkumbini River at both sides of the lagoon. The coastal zone of the Vlora Bay, including that of the Treport, is one of the most active one from the geomorphologic point of view, as well as related to the environmental issues. The coastal lagoons have attracted man's interests for their biological resources richness. Over the centuries, fishing and hunting, more recently nature conservation, have concentrated man's interests on these environments. Such activities have determined the interventions for maintenance of hydraulic circulation within the lagoon, the stabilization of the inlets (channel connecting sea- lagoon), the attempt to control and regulate freshwater input in quantity and quality.

Keywords: *lagoon, wetland, shelf, littoral, spaces, erosion.*

PILOTING BY TENSIOMETERS OF THE IRRIGATION BY INTERNAL DIFFUSION ON DATE PALM IN THE REGION OF BISKRA, ALGERIA

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Abstract

The agriculture in the dry regions depends on the irrigation because of the rarity of the precipitation. The farming sector, during these last years, had a considerable increase by new tree-dwelling plantations, in particular the date palm, strategic culture allowing the durability of the systems of production of the dry regions, but also the development and the vertiginous development of vegetable crops. We also have a population growth, what engenders a pressure on the water resource. It is followed by a driving of the waterings without technical reference (no control of the administered volumes, the modes of irrigation, tour of water). This led to an excessive use of the water resource. This urgently calls for rational use of the water techniques, generally, and the efficiency use of irrigation water in particular. To do it, we have use tensiometers for irrigation scheduling. However, various economic elements prevent the use of tensiometers to gain the ground: (i) Low cost of the water what does not incite the farmers to reason with their irrigations; (ii) Tensiometers are expensive, so that all the farmers are reluctant to use them. The experiment, which we lead in the long term, aims among others: (a) to show the importance of the tensiometers as effective tool of irrigation piloting; (b) to introduce this practice on the basis of the obtained results by spreading in the other similar regions which practice the dry farming; (c) to use rationally the water resource; (d) to save the water of irrigation; (e) to establish references; (f) to establish a calendar (timetable) of the watering; (g) and to put at the disposal of the users a tool allowing them to manage effectively the available water resource. The results obtained show the efficiency of the tensiometers use conjugated to the irrigation by internal distribution.

Keywords: *Piloting, tensiometers, internal diffusion, date palm, oasis, Algeria.*

SUPPLEMENTARY IRRIGATION OF CEREAL IN ALGERIA: AN ALTERNATIVE IN THE ECONOMY OF WATER AND THE FOOD SAFETY

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Abstract

The Mediterranean region includes 60% of the world population "poor" in water (less than 1000 m^3 of water per capita in year). Algeria, which is a part of this region, arranges only 500 m^3 of the water per capita in year (what represents 50% of the ratio of rarity fixed by the World Bank). The resources are already over-exploited in numerous places and the increasing request of water is going to remain high. Cereal is among the rare cultures which make profitable the rainwater. In pluvial conditions, the production of cereal remains limited by the factors of the climate, the characteristics of the ground, the plant material and the cultural practices. The crop yield stagnates for more than half a century and is 8.6 qha^{-1}. Nevertheless, the observation of the values of crop yield obtained seems to improve due to essential reasons, namely a clear improvement in rainfall and the adoption of new economic reforms since 2000 whose impact are visible since 2008. The obtained results by analyzing the evolution of the productions and the yield obtained over the period 2001-2013 showed a mean gain of 11.35 qha^{-1} of the contribution of additional water. This is not negligible, despite the opportunity to do better. The gain of the water supply fluctuates from one year to another and from a speculation to the other, but also, within the same speculation. The work which we propose has following objectives: (i) contribution to the understanding of the stakes and undo which surround us around the question of water and food safety; (ii) the part of the water to improve the cereal yields; (iii) and proposal of new concepts as palliative to the lack of water and the perspectives of development.

Keywords: *Cereal, supplementary irrigation, virtual water, efficiency, food safety, Algeria*

CHARACTERIZATION OF THE PHYSICO-CHEMICAL AND BACTERIOLOGICAL QUALITY OF DAIRY CATTLE WATERING IN EL TARF, ALGERIA

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Abstract

The objective of this study is to evaluate the physico-chemical and bacteriological quality of water from some watering sources of dairy cattle in the wetlands of El Tarf. Our study was carried out on water samples from different dairy cattle farms. Water samples were analyzed during the period from January to June of 2016. The study implies physico-chemical and bacteriological analyzes of various parameters related to the control of water quality in dairy farms. The results obtained have shown that the water has a satisfactory quality in terms of pH, temperature, salinity and can be considered as eligible and does not pose any threat for ruminant's consumption. However, nitrite concentrations exceed the drinking water standards recommended for dairy cattle. The bacteriological quality of the waters is poor and reveals groundwater table contamination by nearby pollutions (agricultural land, cattle breeding, existence of septic tanks), which presents a real threat to dairy cattle.

Key words*: Water, quality, physico-chemical, bacteriological, dairy cattle.*

ENVIRONMENTAL ASPECTS IN CULTIVATION OF PAULOWNIA IN BULGARIA

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Abstract

Paulownia is a relatively new plant species grown in Bulgaria. It is primarily associated with the extraction of timber. The tree is characterized by rapid growth in height, but also with high value of the manufactured wood. The species is of great ecological importance. There are large, bright and fragrant flowers and the big leaves facilitating the absorption of carbon. It is suitable as a honey culture and the most suitable type is Paulownia tomentosa. The plant is propagated in different ways – by seeds, by cuttings and in-vitro method. The most popular method is by cuttings. The seeds are light and easily propagated by wind, but difficult to intercept alone. Because of the large amount of seeds in the seed pod, species is considered invasive for the territory of Bulgaria. The studies aimed at establishing risk of invasiveness and the possible usage of the species in Bulgaria. The studies, based on field measurements, showed that the soil and climatic conditions of the country do not premise invasiveness of the species. The species Paulownia is suitable for cultivation on reclaimed land, as well as for soil erosion control. Based on information collected from different experimental sites it is concluded that Paulownia has a great ecological importance and can be used in different areas.

Keywords: *Paulownia, environmental impact, cultivation, Bulgaria.*

ASSESSMENT OF FACTORS AND RISK OF SHEET WATER EROSION OF SOIL AT A SCALE OF 1: 10 000

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Abstract

Soil erosion is a complex phenomena caused by multiple factors interacting mutually. It is the most severe threat to the functions of soil resources in Bulgaria. The objective of the study was to demonstrate assessments and mapping of the factors and the risk of sheet water erosion based on the Universal Soil Loss Equation integrated with a Geographic Information System using large scale (M 1: 10 000) soil survey information and DEM for the aims of optimization of measures for soil erosion control. The test area was the municipality of Krushari, Dobrich region. The results show that the index of rainfall erosivity (R-factor) for about 63% of the area is 200 - 400 MJ mm/ ha h, nearly 88 % of the territory is occupied by lands with soil erodibility (K-factor) 0.03 to 0.05 t ha h / ha MJ mm) and the lands with a slope above 3° occupy about ¼ of the territory. These factors result to a potential soil erosion risk 0 to 5 t / ha y for about 71% of the lands and 5 to 10 t / ha y for the rest 29 %. The share of lands with actual soil erosion risk below the tolerable soil loss range from about 97-98 % for alfalfa, wheat, barley, spring barley, canola, beans and lentils, sunflower; 93 % for maize; about 81 % for coriander and oats; and about 75.2 % for tobacco and milk thistle. These data were used further for optimization of measures for soil erosion control.

Key words: *Universal Soil Loss Equation, rainfall erosivity, soil erodibility, topography, potential and actual erosion risk.*

EFFECT OF HIVE BUILDING MATERIAL ON BEE COLONIES

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Abstract

This study was carried out in a private apiary at Meet Salseel, Eldaqahliyah Governorate, Egypt for four months to compare foam, clay, cement and white brick with common material (wood), in the construction of *Langstroth* beehive model in a completely randomized design. The evaluation also included three thicknesses of hive sides and three sizes of hives. There were primary measurements on the building materials such as: density, thermal conductivity, water absorption, and rate of water loss. The secondary measurements including: inside hive temperature, bee colony strength (number of occupied frames), productivity (net colony weight, kg.), and the production cost. Results indicated that the mean density of foam, clay, cement and white brick samples were about 49, 2650, 952, and 811 kg/m^3, respectively, while it were 528 kg/m^3 for wooden hives. The mean values of thermal conductivity were 0.93, 0.33, 0.28 and 0.01 Wm^{-1}°C for clay, cement, white brick, and foam samples, respectively, while it were 0.18 Wm^{-1}°C for wooden hives. The cement, white brick and wood samples absorbed 24, 18, and 14 % of water, while the foam simple didn't absorb any water. Cement and white brick samples absorbed more water and lost water faster than wooden one. The maximum inside hive temperature was recorded in foam hive, while the minimum was recorded in white brick hive. The mean number of occupied frames were increased 20.45 and 13.64 % than it in wooden hives for foam and clay hives, respectively, but it were decreased 11.36 and 15.91 % when using cement and white brick hives, respectively. The mean colony net weight, kg were increased about 24.85 and 10.82 % than it in wooden hives for foam and clay hives, respectively, but it were decreased about 11.7 and 7.41 % when using cement and white brick hives, respectively. There was an increasing in mean internal hive temperatures, number of workers/ 5 min, number of occupied frames and colony net weight by decreasing hive size and increasing side thickness. Foam, clay, cement and white brick cost requirements were 80, 73.3, 40 and 63.3 % cheaper than the wooden beehive (150 L. E. without the price of the nest). In general, the foam, clay, cement and white brick hives can be easily constructed with a low cost and with similar characteristics as traditional wooden hives.

Keywords: *Hive building materials, Thermal conductivity, Temperature, Colonies strength and productivity.*

EFFECTS OF TILLAGE METHODS AND NITROGEN FERTILIZATION ON THE PRODUCTION OF SIX ENERGY CROPS

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Abstract

Increasing the yield of energy crops is of key importance for Greece and other European counties in order to achieve the European Community's targets for substitution of imported fossil fuel with locally produced renewable energy. However, in order the cultivation of energy crops to be viable, high yields should be achieved at the lowest possible inputs. Reduced tillage and reduced levels of fertilization reduces crop production inputs. The present study investigates the effects of three soil tillage methods (conventional tillage, reduced tillage and no-tillage) along with three levels of fertilization on yields of six energy crops (pea and triticale intercropping, sunflower, rapeseed, sorghum, oat and vetch intercropping and soybean), cultivated in a rotation system in central Greece. Increasing levels of nitrogen fertilization led to increased rapeseed and sunflower seed yields. The yields of sorghum and soybeans were not affected by the applied fertilization rates. The yields of sorghum, and pea and triticale intercropping, were not affected by the soil tillage methods. The no-tillage method, although it resulted in the highest yield in the case of vetch and oat intercropping under high soil moisture conditions, it gave lower yields in the case of rapeseed, sunflower seed and soya seed. The reduced tillage resulted in yields similar to the yields obtained with the conventional treatment in the case of rapeseed and vetch-oat intercropping. However, it gave a higher yield in the case of sunflower seed, and only in the case of soybean seed, the yield was lower, compared to the conventional tillage. The results of this study indicate that reduced tillage (with a heavy cultivator) can lead to increased production of energy crops, whilst contributing to energy savings, compared to the conventional method (plowing).

Keywords: *Energy crops rotation, Central Greece, Conservation tillage, Yield.*

A GEOTECHNICAL ASSESSMENT OF USABILITY OF A ROCK-SOIL MIXTURE FOR EARTH STRUCTURES

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Abstract

The subject-matter of the work is a mixture of rock and soil from the Lafarge Dubie mine in Rudawa, southern Poland. The conducted tests aimed at the determination of the geotechnical characteristics of this mixture and the evaluation of its suitability for the construction of earth embankments, in particular road ones. The range of the tests comprised determination of parameters characterising physical properties, such as granulometric composition, natural moisture content, density of solid particles, optimum moisture content and maximum dry density of solid particles, as well as mechanical ones, like shear strength. The obtained results show that the tested mixture is suitable for the construction of road embankments, since as coarse-grained soil, it has a high value of the uniformity coefficient (C_u = 1913). Therefore, this is very well graded soil, which provides a good compaction when it is built into the embankment. The natural moisture content (on average w_n = 9.5%) is close to the optimum one (w_{opt} = 8.5%). The maximum dry density of solid particles (ρ_{ds} = 2.16 g·cm^{-3}) is much higher than the minimum required ($\rho_d \geq 1.6$ g·cm^{-3}). The values of the angle of internal friction (on average ϕ = 36°) and cohesion (c = 42 kPa) indicate great shear strength, therefore this soil can be subjected to considerable mechanical stresses.

Key words: *earth structures, rock-soil mixture, geotechnical properties, road embankment.*

MERCURY BELONGS TO HEAVY METALS WITH A NEGATIVE IMPACT ON THE ENVIROMENT

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Abstract

Mercury does not undergo the biodegradation, so it persists in the environment for a long period of time. It is easily soluble in soils and is able to migrate deep into the profile. Mercury and its organic compounds are included in various specimens such as plant protection products, fungicides and phosphorous fertilizers (0,01-1,2 mg $Hg \cdot kg^{-1}$) and nitrogenous fertilizers (0,01-1,2 mg $Hg \cdot kg^{-1}$). The aim of these studies was the assessment of the mercury content in soils with intensive agricultural impact. The research was carried on soil samplers originated from plough land after using nitrogenous fertilizers and manure. Soil samples were obtained from four corners and from the middle of 10 x 10 research area and, then, a mixed sample was created. Samples were obtained from two depths -0-20 cm and 20- 40 cm. In samples obtained with that technique the texture was marked using the laser method, organic carbon content using the carbon analizer and nitrogen, pH by the potentiometric method in the KCl solution with 1 $mol \cdot dm^{-3}$ concentration and H_2O, $CaCO_3$ using Scheibler's method, mercury using AMA 254 analizer, statistic analysis Statistica 12.0. On the basis of the texture analysis examined soils were ranked among sandy loam. Content of fraction $ø < 0.002$ mm was ranged between 3.93-5.19%. They were distinguished by C org. content within range 1.79- 7.2 $g \cdot kg^{-1}$ and pH_{KCl} within range 6.02-7.72. Mercury contents were within range17.72 to 30.55 $\mu g \cdot kg^{-1}$. Mercury contents were balanced in examined soils. In spite of the established mercury with fertilizers, the concentration growth was not declared in the examined soils.

Keywords: *agricultural soil, mercury, nitrogen fertilizers.*

EFFECT OF A SIMPLE VERTICAL TILLAGE TOOL OVER DRAG RESISTANCE AND SOIL MOBILIZATION

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Abstract

The paper aims to provide analysis of interaction between a simple rectangular tillage tool moved with constant speed in a soil model without cohesion (coarse sand). For simulation, the LS-DYNA finite element method (FEM) analysis was used. For the geometric model with length 400 mm, width 300 mm and depth 500 mm, the soil material model 147 was chosen. The element grid has 9305 nodes and a network of 8010 solid rectangular elements. For base surface and lateral surfaces appropriate boundary conditions were imposed. The tillage tool is a rectangular prism with length 322 mm, width 20 mm, in vertical position at a depth of 222 mm. The tool speed was imposed to 1.5 m/s alike experimental test rig tool. The experimental test rig allows the movement of 4 tools on circular trajectory with diameter 1700-2000 mm, at maximum depth 900 mm. The interface contacts between the tool and the soil material was modeled automatically by the application software. Tension wave propagation in the soil, speed and accelerations of soil and tool nodes can be obtained and visualized. Soil displacement in three directions shows good similarity with experimental results. Natural tool vibration and soil acceleration was also investigated to reduce the drag force. The simulation shows a lower drag force than experimental result, thus further investigation is needed on FEM modelling. The reduction of the drag force will decrease the required energy in the tillage process, thus reducing the fuel consumption and the environmental pollution.

Keywords: *tillage tool, FEM model, soil resistance, soil disturbance, soil-tool interaction.*

ECONOMIC ASPECTS OF FLOOD CONTROL IN AUTONOMOUS PROVINCE OF VOJVODINA (SERBIA): CASE STUDY FOR THE RIVER SAVA

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Abstract

The aim of this study was to demonstrate the socio-economic feasibility of protection against flood in the area of the river Sava in Autonomous Province of Vojvodina (Serbia). In this case as a technical solution of protection from external flood water it was proposed construction of new dikes, reconstruction of old dikes and procurement of mobile equipment. The methods that were used for evaluation were: the present value of investment and operating costs, equivalent annual cost, the average economic cost (per 1 ha) of protected areas, average economic cost per protected resident and sensitivity analysis. The study was conducted on the case of the left bank of the Sava River (length 50 km) in order to achieve the optimal level of protection of humans, settlements, agriculture and other material goods in this area. The results of research showed that flood damage to this area could be 3.42 times greater than required investments in the construction of buildings and purchase of related equipment. The largest damage would be on residential buildings and agricultural land. The investments of 3.407 mil. €, in the long term, would protect 23,000 ha of agricultural land, 5,300 hectares of residential and commercial buildings and 135,000 inhabitants.

Keywords: *Embankment, Flooding, Investments, Damage, Operating Cost.*

EVALUATION OF DIFFERENT AGRICULTURAL PRODUCTION SYSTEMS AND ENVIRONMENT RELATIONSHIP APPROACHES

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Abstract

Agriculture has become the most important part of the global economy since the 1950s.While local trade gives the place to complex commercial networks and trade relations, agriculture as well as modern economy in agriculture and the accumulation of capital have become "industrial sector". Until the early years of 90s, with almost every country being in the first place, the main objective of the developed countries is to increase agricultural yield per unit area and thus ensure maximum profit by decreasing the production cost. The most prominent milestone is called "green revolution" which is scientific developments on plant nutrition products and plant protection pesticides. That the agricultural production increase is much higher than the desired level, revealing waste and demand problems along with the ecological crisis and the developments in demographics bringing up different purposes to the agenda. Awareness is arisen among the consumers with interest of sustainable and healthier agricultural production and food consumption in all over the world. It is essential that all the systems regarding food production and consumption in the future have to be based on ecological and integrated approaches. Besides, minimum environmental impacts and efficient natural resources usage should be considered as criteria in these systems. Different approaches upon dynamic agricultural production system will be evaluated in a holistic way in this study.

Keywords: *Agriculture, ecological crises, consumption.*

A RESEARCH ON POMEGRANATE (PUNICA GRANATUM L.) GROWING AND THE STATE OF SELECTION STUDIES IN TURKEY

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Abstract

Pomegranate for which Asia Minor is the gene centre is a tropic and subtropic fruit and one of the oldest cultivated agricultural products. According to 2015 statistics Turkey has 445.750 tons of total pomegranate production. In Turkey, pomegranate is one of the many investigated fruit species in selection studies. The richness of our country on genetic variation of this species provides facility for achievement in breeding studies in a short period of time. Because this fruit is cultivated on many regions of Turkey, it is extremely important to develop varieties proper for many areas. Pomegranate is one of the most important fruit species that are consumed in Turkey. Therefore, some of several superior pomegranate types obtained during the selection studies performed in different areas of our country to date have been registered as cultivar. The some pomegranate varieties located in the registered list of Food, Agriculture and Livestock Ministry are Fellahyemez (01N04), Katırbaşılı (31N07), Ekşilik (01N07), Hicaznar (07N08), İzmir-1264, İzmir-1499, İzmir-1513, Erdemli-Aşınar (33N11), İzmir-23, İzmir-26, Ernar (07N03), Lefan (31N06), Silifke Aşısı (33N16), Ekşi Göknar (33N12) and Mayhoş-IV (07N14). This study aimed to determine the status of pomegranate cultivation and to demonstrate of some pomegranate types selected from different regions to produce better quality and more efficient pomegranates in Turkey.

Keywords: *Pomegranate, Genetic resources, Selection, Production.*

EFFECTS OF HEAVY METAL CONCENTRATIONS (Zn) ON THE BIOLOGICAL ACTIVITY OF SOIL

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Abstract

The interest for the issue of soil contamination of with heavy metals has increased recently, because such metals can affect the performance of soil both qualitatively and quantitatively. Heavy metals disturb the activities of the fauna, flora and soil micro-organisms. Heavy metals are well known to be toxic to most organisms when present in excessive concentrations. This work studies the effect of increasing concentrations of zinc on the biological activity of soil. The samples of soil were artificially polluted , being saturated with 80% of RC (retention capacity) with a solution of ZnC_{l2} For this study, five repetitions were carried out for each concentration of zinc (Zn_0=0; Zn_1=150 mg kg^{-1}; Zn_2=300 mg kg^{-1}; Zn_3= 450 mg kg^{-1}; Zn_4=60 mg $kg^{-1)}$. The samples of soil were incubated for 28 days, and then subjected to fumigation-extraction. The results show that an increase in the zinc contents in the soil is accompanied by an increase in the quantity of released $C\text{-}CO_2$. The quantity of $C\text{-}CO_2$ reaches the highest value for the concentration of Zn_2, and then it falls gradually to reach the lowest value for the concentration Zn_4. The study of the correlations between the studied parameters shows that $C\text{-}CO_2$ (cumulative carbon dioxide produced by microorganisms), CF (fumigated organic carbon) and CNF (non-fumigated organic carbon) are statistically linked to the increase in concentrations of zinc in the soil. This research confirms the effect of zinc on the activity of soil microorganisms.

Key words: *Zinc, soil, microorganisms, incubation, carbone organique.*

THE ANTIHEMOLYTIC EFFECT *IN VITRO*; ANTI-INFLAMMATORY AND ANTIOXYDANT ACTIVITY OF *ANCHUSA AZUREA*

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Abstract

Anchsaazurea (AA) is a medicinal plant largely used traditionally in folk medicine in Algeria, locally named Hamham and Tasselgha.It is effective in the treatment of various diseases. In this study, the preparation of various extracts from *Anchsaazurea* (AA) using solvent with increasing polarity was determined. The quantification of polyphenols and flavonoids showed that the extract ethyl acetate (AcE) contained the higher amount of polyphenols. However, chloroform extract (ECh-AA) presented the higher amount of flavonoids. EAc-AA showed an important scavenging activity using the DPPH radical (IC_{50}= 68.35 µg/ml). The results showed that extracts EAc-AA also exhibited very great inhibition on the oxidation of β-carotene/linoleic acid (84.33%, 84.05% and 76.21%, respectively). All extracts increased the HT_{50} values (Half-Hemolysis Time) in dose-dependent manner. The antioxidant activity of extracts was confirmed in mice. The administration of EBr-AA (100 and 200 mg/ kg/day) for 21 days resulted in a significant amelioration in both blood and plasma antioxidant capacity. The anti-inflammatory effect using PMA on mice showed that the methanolic extract of both plants reduced the weight of the ear edema. In conclusion, these plants have a strong pharmacological power, which supports their medicinal traditional use.

Keywords: *Flavonoids and polyphenols, Antioxidant, Antihemolytic, Anti-inflammatory.*

ASESSEMENT OF DATE PALM (*PHOENIX DACTYLIFERA* L.) GENETIC EROSION IN ALGERIAN GROVES

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Abstract

Algeria is one of the richest countries in terms of date palm biodiversity with its 940 cultivars (Hannachi et al. 1998). However, the most trade-marketable date cultivar "Deglet Noor" represents more than 51% of total date palm production (M.A.D.R. 2014) involving the disappearance of Algerian genetic resources. The aim of this study was to assess the date palm genetic erosion using some biodiversity indices based on the data from the surveys conducted from 2013 to 2015 in thirteen districts. The results clearly showed the dominance of Deglet Noor in Ouest region and Ghars, Mech Degla and common date cultivars in the Est. Moreover, the frequency of these latest cultivars was lower. The erosion rate varied from 18% in Biskra to 84.4% in M'choonesh, where the most important varietal richness was recorded (36 cultivars). The Jaccard similarity index was more important between the closest oases due to their geographical proximity, resulting in the exchange of plant materials. In total, only seven cultivars were commonly inventoried in all surveyed regions. The index of Shannon-Weaver showed there was a more homogeneous structure in some of the Est districts due to the evenness of cultivars, while, the index had the lowest value (0.55) in Tolga region where the famous Deglet Noor cultivar is mostly cultivated. This study showed the usefulness of ecological indices to allow better understanding of the status of the Algerian groves biodiversity.

Key words*:* *Date palm, genetic erosion, ecological indexes, Algeria.*

SEASONAL ABUNDANCE OF SOIL INVERTEBRATES UNDER FODDER CROPS (CLOVER AND BARLEY)

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Abstract

The current study gathers new data on soil invertebrates in North Algerian soils. Invertebrates play significant role in soil functions. They may be the best possible indicators of soil quality and can improve the agro-ecosystem conditions. The prediction of invertebrate density is important to accurately assess the role they are playing in soil quality. Data were collected under two fodder species *(Hordeum vulgare, Trifolium pretense)* for two seasons in the Boukhalfa. The objectives were to determine levels of soil fauna abundance and to hierarchize the factors controlling their distribution. We particularly investigated the effects of fodder species, depth and season. This work allowed us to identify 10 faunal groups in two plots belonging to the same lithotopesquence. Folder species and season (summer, winter) factors as well as their interaction influenced total soil invertebrates abundance. It appears that invertebrates are mainly influenced by plant species and season. To make a more general statement about the results and conclusion, this type of studies needs to be applied to different soils, fodder species and other climates in Northern Africa.

Key words*: invertebrates, soil characteristics, fodder species, seasons, Algeria.*

SPATIOTEMPORAL VARIABILITY OF THE ANNUAL RAINFALL AND ITS EFFECTS ON FARMING ACTIVITIES

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Abstract

This paper aimed at studying the rainfall trends through the analysis of the 1970-2011 time series for annual precipitations and the inherent effects on the farming systems in a semi-arid region of Algeria. The evolution of the rainfall pattern was studied via 50 weather rain gauges spread over the study area. Changes in farming activities engendered by climate change, such as a shifting to new farming systems and or reasons for abandoning farming activities were carried out on a sample of (349) farms, spread over two agro-ecological regions: the northern and southern zones. The annual rainfall maps and the probability maps showed a high spatiotemporal variability for the periods 1970-1990 and 1991-2011. Indeed some areas tended to become wet, in contrast other areas were more affected by drought severity. The main changes in agricultural activities for adapting to climate change were a declineinagricultural areas devoted to rainfed crops (cereals) and the adoption of an intensive farming system based on poultry, cattle breeding and intensive crops, especially in the southern zone. However, the cases of farming abandonment were not caused by climate change but by some anthropogenic factors. The challenge of agricultural development programs in the future context of climate change will be to manage the conversion of the ancestral farming systems to sustainable systems, preserve the social value of agriculture and boost the economic profitability of farms without affecting natural resources.

Keywords: *Climate change, Rainfall, Farming, semi-arid, Algeria.*

METHANE PRODUCTION FROM BROWSE SPECIES OF ALGERIAN ARID AND SEMI-ARID AREAS

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Abstract

The ruminal methane production is a by-product of the microbial digestive process and represents a loss of 2–12% of the feed energy. Furthermore, emission of methane is considered as one of the most important global environmental issues. Then, the objectives of the study were to determine the *in vitro* methane production (CH_4) from the rumen fermentation of ten browse species. Serum bottles containing 500 mg substrate and 50 ml of buffered rumen fluid were incubated for 24 h. Three adult rumen cannulated sheep were used as donors for rumen fluid. After incubation gas and methane productions were recorded. Gas production was higher for *Medicago sativa* (119 ml/g DM) and lower for S. *tenacissima* (40 ml/g DM, respectively) than for the other browse species. Methane production expressed as ml/g DM varied greatly. The lowest methane production was seen for *S. tenacissima* and *A. macrostachyum* (11.4 and 11.5 ml/g DM incubated, respectively) and the highest for *A. sativa* and *A. gombo* (25.8 and 22. 7 ml/g DM, respectively). The differences among species were shrunk when methane was expressed per mL of total gas produced. This would indicate that a lower methane production would be due mainly to a low fermentability of the substrate incubated, rather than to a specific inhibitory effect on methanogenesis. Hence, the ten browse species studied herein would show little potential for mitigating methane production in the rumen.

Keywords*: Forage, Gas production, Methane, Methanogenesis.*

EVALUATION OF WATER POTENTIALITIES IN THE AQUIFERS; CASE STUDY OF BISKRA REGION (ZIBANS), ALGERIA

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Abstract

Zibans, known as Sahara portal, is located between two different areas in terms of climate, geology and especially hydrogeology. The northern domains include the Saharan Atlas, and the southern areas represent the Sahara. The exploitation of the groundwater resource is particularly significant in some aquifers more or less deep (Quaternary, Mio-Pliocene and Eocene). Biskra suffer from an intense agricultural activity, created by the development and enhancement program of lands, which menace the durability of this groundwater resource, in addition to the irrational exploitation. The obtained results allowed us to evaluate hydric potentialities in the area, by using a geostatistical approach (ArcGIS 10.) based on the determination of aquifers rock volumes and storage coefficients values.

Keywords: *ground water, aquifers rock's volumes, ArcGIS 10., storage coefficients, groundwater potentialities.*

RECOVERY OF PHOSPHORUS FROM SEWAGE SLUDGE ASHES

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Abstract

In the RecoPhos process – developed by the Chair of Thermal Processing Technology (Montanuniversitaet Leoben) in the course of the EU-project RecoPhos – pure, elementary phosphorus can be almost completely recovered from sewage sludge ashes. The ashes are fed to a reactor that is filled with pieces of graphite. The graphite is inductively heated and the ashes melt on its surface. While moving through the reactor, metal oxides and phosphates (Fe-, Al- and Ca-phosphates) are reduced. They react with carbon that is added to the feed. This added-carbon source is more reactive than the graphite in the bed, so the bed itself is protected from exhaustion. The products of the RecoPhos process are a silicate slag, which can be used in the building material industry, a metal phase and – mainly – pure, elementary, gaseous phosphorus (P_4 that dissociates to P_2). The gaseous products leave the reactor through a tube. An induced draft fan secures the low-pressure conditions and the gas flow direction in the plant. At this point, the gaseous phosphorus can be used to create any phosphorus-based product desired. Currently, the phosphorus and the CO from the reduction are burned and, in turn, the P_2O_5 reacts to phosphoric acid in a gas scrubber. The process provides a secondary phosphorus source that can meet the high requirements of fertilizer production, especially regarding the availability to plants. A key aspect is a thin film of molten ash and the gaseous P-phase, which reduces the accumulation of phosphorus in the iron phase to a minimum.

Key words: *phosphorus recovery, fertilizer production, sewage sludge ash processing, carbo-thermal phosphate reduction.*

WATER MANAGEMENT IN THE COASTAL ZONE TO ADDRESS FUTURE FOOD SECURITY CHALLENGES OF BANGLADESH

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Abstract

The rivers in the coastal zone of Bangladesh are tidal, resulting in tidal flooding of adjacent lands in the rainy season. About 1.2 million ha of land were therefore poldered during the 1960s and 1970s to reduce theloss of life and enable the production of *aman* (wet season) rice. While tens of millions of dollars have beeninvested in the development and maintenance of the polders over the last 50 years, the coastal zone is still home to the world's poorest, most food-insecureand most vulnerable rural people. Salinity is commonly perceived to be the main reason for non-adoption of improved agricultural technologies and low productivity in this zone. However, the results of this study conducted during 2011-2016 on salinity gradients showed the feasibility of intensifying and diversifying production systems within the polders,having 2-3 times higher productivity than in the current farmers' practice. The key prerequisite for the implementation of the improved production systems in the polders is the drainage during the aman season,mainly for using top-dressing nitrogen fertilizers, in early November prior to rice harvest, for timely establishment of dry season (*rabi*) crops and to save the rabicrops from heavy rains. This can easily be achieved by having systematic operation of sluice gates synchronized with thetidal phenomenonin the river systems, together with the creation of hydrologically defined community water management units and synchronized cropping involving the community. Thus the underutilized lands of the coastal zone could be brought under improved production systems to address future challenges to the food security of Bangladesh.

Keywords: *Community water management, coastal zone, synchronized cropping, food security.*

COMPARISON OF TWO COLORIMETRIC METHODS FOR DETERMINATION OF TOTAL PHOSPHORUS IN SOILS

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Abstract

The most widely used method for determination of total phosphorus in soils is perchloric acid digestion, which is a recognised standard. The first part of this study compares an alternative digestion method, using aqua regia (ISO 11466 and EPA Method 3052) and HF + $HClO_4$, with perchloric acid digestion procedure, and also compares two methods for the measurement of P on the basis of five internationally certified standard soils and 20 real-life soils with widely different extractability of phosphorus. The total phosphorus in soil extracts was measured colourimetrically after neutralisation of the digests to pH 3±0.5 by two widely spread methods: (i) method of Murphy and Riley and (ii) Phosphate test Spectroquant (Merck KGaA), using Boeco S-22 UV/VIS Spectrophotometer and Spectroquant Pharo 100 spectrometer, respectively. The relationships between methods are examined statistically. A good agreement of the results from ISO 11466 and EPA Method 3052 was established for all certified samples. The microwave aqua regia method was comparable, both in precision and accuracy, with the hot plate aqua regia method. The phosphorous amount found with the HF + $HClO_4$ digestion method was in good agreement with the certified mean values while the superiority in extracting phosphorus, when compared to other methods, was obvious. The method suggested by Merk KGaA has significant advantages. They are mainly related to rapidity and ease of determination. However, in this case, a significant dilution of samples shall be required (dilution factor over 2000), which may considerably affect the measurement accuracy.

Keywords: *Phosphorus determination, Murphy and Riley, Phosphate test Spectroquant.*

SPATIO-TEMPORAL VARIATION OF FISH TAXONOMIC COMPOSITION IN A SOUTH-EAST ASIAN FLOOD-PULSE SYSTEM

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Abstract

The Tonle Sap Lake (TSL) is a flood-pulse system. It is the largest natural lake in South-East Asia and constitutes one of the largest fisheries over the world, supporting the livelihood of million peoples. Nonetheless, the Mekong River Basin is changing rapidly due to accelerating water infrastructure development (hydropower, irrigation, flood control, and water supply) and climate change, bringing considerable modifications to the annual flood pulse of the TSL. Such modifications are expected to have strong impacts on fish biodiversity and abundance. This paper aims to characterize the spatio-temporal variations of fish taxonomic composition and to highlights the underlying determinants of these variations. For this purpose, we used data collected from a community catch monitoring program conducted at six sites during 141 weeks, covering two full hydrological cycles. For each week, we estimated beta diversity as the total variance of the site-by-species community matrix and partitioned it into Local Contribution to Beta Diversity (LCBD) and Species Contribution to Beta Diversity (SCBD). We then performed multiple linear regressions to determine whether species richness, species abundances and water level explained the temporal variation in the contribution of site and species to beta diversity. Our results indicate strong temporal variation of beta diversity due to differential contributions of sites and species to the spatial variation of fish taxonomic composition. We further found that the direction, the shape and the relative effect of species richness, abundances and water level on temporal variation in LCBD and SCBD values greatly varied among sites, thus suggesting spatial variation in the processes leading to temporal variation in community composition. Overall, our results suggest that fish taxonomic composition is not homogeneously distributed over space and time and is likely to be impacted in the future if the flood-pulse dynamic of the system is altered by human activities.

Key words: *fish, floods-pulse system, water infrastructure development.*

GREEN BUILDING TECHNIQUES IN EGYPTIAN SCHOOLS: USING SOLAR ENERGY TO REUSE GRAY WATER

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Abstract

Egypt is nowadays facing a lot of challenges, such as limited water and energy resources. In the near future and after building El-NAHDA Dam in Ethiopia, Egypt will suffer from a severe aqueous shortage. This will be a natural result of the growing population and lack of water resources. Another fatal problem is the unavailability of getting enough energy supplies. Here, the energy problem is a natural consequence of unsustainable development of the energy patterns followed during the last decades. To alleviate severe suffering from a shortage of water and energy sources, suggested solutions should be innovative and sustainable. There are many new water resources that have not been well exploited in terms of agriculture. One of these resources is gray water in Egyptian schools. This new resource can be managed by solar energy, as Egypt has good weather with high rates of solar radiation which can reach up to 3000 hours/year. The average intensity of solar radiation is up to 6 kilowatt hour /M2/ day. The process of pumping out drainage water for agriculture by using solar energy is a good alternative in terms of sustainable development. The main goal of the study is to reuse gray water for vegetable production on school roofs after pumping it out by solar energy.

Key words: *Green building, Solar energy, Reuse of gray water, Drip irrigation, Green roofs, Water and energy use efficiency.*

A "GREEN" FUTURE FOR PLANT PATHOLOGY? SMART BIOFUMIGATION AS A NEW AND INNOVATIVE TECHNOLOGY FOR CONTROLLING PLANT DISEASES

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Abstract

Smart biofumigation is a sustainable and innovative technology and can be used worldwide to cope with different soil conditions either alkaline, like those in the Middle East, or acidic soils, like those in Europe. Smart biofumigation can provide a sustainable intensification on the ground and move from aspiration to fixed descriptive and existing agricultural production systems whether conventional, Global GAP, biodynamic or organic agricultural systems. We have to work together to protect our planet and to protect the environment for the new generations in a sustainable ways. Smart biofumigation not only solve the soil-borne plant pathogens but also both root-knot nematode and aggressive weeds. Moreover, our modified and innovative technology can be adopted and work efficiently against these soil contaminations by those pathogens and pests compared with other chemical pesticides i.e. Methyl Bromide that was banned since 2005 and cannot used in both Global GAP or Organic agriculture systems. We have to emphasize that our innovative technology has a positive role in climate change mitigation compared with other banned chemical fumigants by the United Nation. Finally, our innovative, smart biofumigation technology is ecofriendly and cheap, feasible and can be applied worldwide.

Key words: *Biofumigation, innovative technology, plant diseases.*

SAND DUNE MOVEMENT AND ITS IMPACT ON DEVELOPMENT PLANS, SIWA OASIS, EGYPT

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Abstract

The Siwa Oasis in Egypt is a natural depression about 23 m below sea level. The Siwa depression covers about 295,198 feddans, and it is a boundary around human activities in the Siwa Oasis, of which about 48,347 feddans were cultivated in 2015. The Siwa Oasis is situated in the north of the sand dune belt of the Great Sand Sea. The study aims to economically evaluate hazards of sand dune movement (SDM) and its impact on agriculture development in the south of the Siwa Oasis and to propose the required adaptation measures. The total area affected by SDM is about 50,629 feddans. The total cost of economic losses as a result of the SDM risk is estimated to 485.9 million LE. The total protecting cost the cultivated area, roads and drainage of the SDM risk in the Siwa Oasis are estimated to 47.9 million LE.

Key words: *Development Plans (DP), Sand Dune Movement (SDM), Land Use/Land Cover (LU/LC), Decision Support Systems (DSS), Geographic Information System(GIS).*

FACTORS AFFECTING LOCAL PEOPLE PARTICIPATION IN FOREST MANAGED FOR CARBON SEQUESTRATION: THE CASE OF MOUNT DAMOTA, WOLAITA, SOUTHERN ETHIOPIA

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Abstract

The main purpose of this study was to examine factors affecting local people participation in forest managed for carbon sequestration in the case of Mount Damta of Southern Ethiopia. The data were collected through document analysis, field observation, focus group discussions, key informant interview and by surveying 146 randomly selected households. The collected data were analyzed by using descriptive statistic, participation index and binary logistic regression. The study indicated that the level of participation of the local people was low and passive in terms of attending the selected activities of the forest management. However, majority of respondents participated in implementation phase activities. The level of participation of the local people was found being determined by age, sex, family size, where training and education were seen positively while land holding size, wealth, a distance from the forest and membership in executive committee were seen negatively. Therefore, further efforts have to be made to enable the local people to be active participants in all processes of the forest management project.

Key words: *Forest Management, Local People Participation, Mount Damota.*

EFFICIENCY OF INTERO MODEL TO PREDICT SOIL EROSION INTENSITY AND SEDIMENT YIELD IN KHAMSAN REPRESENTATIVE WATERSHED (WEST OF IRAN)

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Abstract

Application of empirical models is inevitable because of the complexity of process, features, spatial and temporal variation of soil erosion and non-existence or lack of associated data. In the present study, maximum outflow and soil erosion intensity were predicted for Khamsan representative watershed in West of Iran, using IntEro model. The results of production of erosion material in the river basin (W year), coefficient of the deposit retention (Ru) and real soil losses (G year) were then compared with the measured soil erosion, SDR and sediment yield data in Khamsan watershed. The intensity of the erosion process were medium in studied watershed. The predicted data were compared with the measured sediment yield of studied watershed and verified the acceptable results of the IntEro model in Khamsan representative watershed.

Keywords: *IntErO Model, Land Use, Runoff, Sediment Delivery Ratio, Soil Degradation.*

EVALUATION OF QUALITY AND MORPHOMETRY OF DIFFERENT GENOTYPES OF COTTONSEED AGAINST SALINITY

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Abstract

Cotton is one of the most commercially important crops,useful for fibrous. Salinity is the major abiotic stress that intensively affects crop productivity, particularly in the world. Seedling of cotton is very sensitive to sodium and other salt soils. Under these conditions, cotton seeds fail to germinate or germinate with severe delay. Although cotton is relatively salt-tolerant, variations in such tolerance have been found among different cultivars. This research was conducted to evaluate three genotypes of different species *Gossypium hirsutum* (Golestan and Sepid) and *Gossypium barbadense* (Termez14) under three saline soil control (non saline), moderate salinity (8-9dSm^{-1}) and severe salinity (12-13dSm^{-1}) in pot under shelter. Phenol content of crust kernel in Termez14 under severe salinity was least. Phenol seed content in Termez14 was more than phenol concentration of crust kernel. Accumulation phenol in seed of Termez14 was more than in Sepid. Number of carpel in seed of Termez14 under moderate and severe saline soil decreased among other genotypes under all salinity treatments. Termez14 in non salinity had most seed in each carpel. Seed weights of Termez14 in moderate and non saline soil were highest. Sepid in non and medium salinity stress had most fiber weight, but minimum fiber weigh twas found in Termez14 against moderate salinity. Sepid and Termez14 had highest and lowest sepal weight under non and moderate salinity stress, respectively. Length of cottonseed in Golestan was smallest against severe salinity. Qatar of cottonseed in Golestan and Sepidin severe salinity stress was minutest rather than all of them. Results showed that cottonseed of Golestan was most sensitive to high salinity stress. Accumulation of phenol in Golestan caused tolerance against pests and disease.

Keywords: *Cottonseed, crust seed, kernel, phenol, Salinity*.

EFFECT OF SAWDUST ON SPLASH EROSION IN LABORATORY CONDITION

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Abstract

Splash erosion is caused by the impact of raindrops on the soil surface and leads to the detachment of the soil particles. The most effective measures for reducing soil splash are the use of conditioners to improve soil aggregates stability and/or to deploy physical barriers to minimize raindrop impacts. The present study has been conducted to examine the efficiency of sawdust to reduce splash erosion rate in 15% gradient slope with sandy-clay-loam soil in the laboratory condition. To achieve the study purposes, the soil were covered by sawdust with the surfaces percentages of 30, 50, 70 and 90% in nine splash cups placed on the soil in three replicates for each control and treated conditions. A portable rainfall simulator was used to simulate rainfall with the intensity and duration of 40 mm h^{-1} and 15 min, respectively. The results of splash showed that the sawdust reduced both total and net splash. In addition, the results showed that coverage of about 50% and 90% of soil surface by sawdust can reduce net splash by about half and to about a quarter of its rate, respectively.

Keywords: *Soil Amendments, Soil Conservation, Soil Erosion, Rainfall Simulator.*

PHOSPHOROUS AND LIME-INDUCED ZINC FRACTIONS TRANSFORMATIONS IN ZN DEFICIT TROPICAL PADDY SOILS

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Abstract

The soil geochemical Zn controlling factors in soil solid- solution equilibrium influence phyto- available forms of Zn in soil Zinc fraction pools. The current study was conducted to investigate the effects of some of the most important of these factors (various levels of Phosphorus (P), lime, and Zn) on Zn fractions in six tropical paddy soils. The sequential fractionation procedure was used to determine soils Zn fractions after 30 days of submerged incubation threaten by aforementioned factors. Analysis of variance showed that the concentration of Zn fractions were significantly affected by soil type ($P \leq 0.01$), Zn levels ($P \leq 0.01$), lime application ($P \leq 0.01$), P ($P \leq 0.01$) and also by treatments combination interactions ($p \leq 0.01$). The non- residual and available fractions (water soluble plus exchangeable (WE) and organic complexes (Org)) increased by Zn treatments about 1.29 to 2.65 times, and 1.7 to 4 times, respectively and decreased with increasing lime application levels about 9 to 30%, and 3 to 37%, whereas the non-residual and non-available (amorphous (Amor) and manganese oxides (MN)) and the residual fractions increased with the increasing level of applied P and lime. The effects of P, lime and Zn applications on Zn fractions were similar for all soils. The application of P plus lime was more effective in reducing available Zn fractions and increasing non available fractions than the separate application of P or lime between 30 to 70%. In addition, the results showed that the most of the applied Zn were converted to the unavailable fractions.

Keywords: *Tropical paddy soil, Zinc fractionation, Lime, Phosphorus, Zinc.*

USE OF BRACKISH WATER FOR AGRICULTURE IN IRAQ

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Abstract

Over the past 30 years, Iraq has transformed from a water rich country, with a secure and relatively abundant supply of water, to a water stressed nation. The country's antiquated water collection, storage and distribution infrastructure leads to significant losses through evaporation, wastage and leakage,and finally; (6) the inefficient use of water by farmers due to poor agricultural water distribution grids and management practices, soil salinization, poor canals maintenance and scarcity of power for water pumps.mAs Iraqi population continues to grow and the pace of economic development picks up, these trends will only get worse in the coming decades. At the current rate of economic growth and the decline of water resources, Iraq faces chronic shortages of water in the coming two decades. The quantity of water coming to Iraq from outside the country constitutes about 90% of its total, 80% of which is surface water – the main source of water for all sectors of the country. The other 20% comes either from the inside basins, ground water or precipitation. Data presented in this paper reveals that the average annual inflow of the Tigris and its tributaries into Iraq from 1933-1973 was 49.15 Bcm. In contrast, the average annual in flow up to 2008 was only 47.3 Bcm. The decrease in the Euphrates is much higher than that of the Tigris due to the extensive development projects in Turkey and Syria. The average dropped from 29.89 Bcm to 19.36 Bcmfor the years 1930-1973 and 1994-2008 respectively. The decline in the average rate of precipitation was approximately two folds in 2008 compared to 30 years average. The renewable ground water reserve is estimated at 7 Bcm, about 4 of which is under use in spite of its salt content. The drainage water resulting from irrigating agriculture land is about 6 Bcm per year, although this is an outdated estimation, and its salt content is very high. As Iraqi supply of water meteorites, so does its quality of water. Tests show a threefold increase of the salt concentration in Iraqi main rivers over the past half century, resulting in severely brackish water by the time the rivers flow into Southern Iraq. In view of these facts, the issue of brackish water will become a leading problem for Iraqi water managers. In the coming years, brackish water is expected to account for about half of Iraqi total surface water and almost all of its shallow aquifers. The paper concludes and stressed that traditional land reclamation procedures alone are no longer an option for Iraqi water managers. The development and adaptation of salt tolerant crop varieties, in addition to the introduction of more efficient agricultural techniques and technologies, will be critical to rehabilitate Iraqi agricultural lands.

Keywords: *Brackish water, Iraq, Soil Salinity.*

NITRATE REMOVAL FROM TILE DRAINAGE WATER USING WOODCHIP DENITRIFICATION BIOREACTORS

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Abstract

Tile drainage systems introduced in agricultural areas significantly alter water and nutrient balance and increase water pollution via accelerated nitrates leaching from the soil. In order to reduce this negative effect, new ways and measures to reconstruct tile drainage systems are being searched for. One of the possible solutions of this problem is installation of denitrification bioreactors at the outlets of the systems. Their presence is based on biological removal of nitrate-nitrogen from tile water under anaerobic conditions. Three denitrification bioreactors imitating tile drainage systems were created in Drainage laboratory of the Water Resources Engineering Institute at Aleksandras Stulginskis University, Lithuania. Bioreactors containers were filled with deciduous, coniferous and mixed wood chips. Laboratory and field tests have shown that the average nitrate-nitrogen removal from water in the bioreactor filled with deciduous woodchips was 66%, with conifer woodchips – 68%, and with mixed woodchips filler – 67%. The obtained results suggested that denitrification bioreactors could be applied in tile drainage systems as edge of field measure to reduce water pollution in drained agricultural areas.

Keywords: *agricultural drainage, nitrate-nitrogen, denitrification bioreactors, water quality.*

THE IMPACT OF PIPE SPACING ON DRAINAGE OF SURPLUS SOIL WATER

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Abstract

Agricultural production is very risky on such developed agricultural areas, especially when surplus and/or deficit of precipitation occurs before or during the growing season. Such conditions make production planning very difficult and/or almost impossible, because production, and thereby also yield, depends on weather conditions, making yields of field crops and their quality highly variable. If soil water surplus persists during a long period of time and being the zone of plant roots in a part of the growing period, then the hydro-amelioration measure of drainage should be applied. Drainage of surplus water is an ameliorative procedure that involves the collection and removal of surplus water from soils intended for cropping or some other activity. The goal of three-year investigations was to determine the influence of precipitation upon drainage discharge (runoff) in two different climatic regions (Croatia and Lithuania) at two different pipe drainage spacings in each region; 15 m and 20 m drainage spacing in the first region and 12 m and 18 m drainage spacing in the second region . The researchers calculated soil water balance according Thornthwaite's method, compared the measured drainage discharge and calculated the surplus of water in the soil. The investigations were carried out at the experimental amelioration site in the central Sava Valley (Croatia) and the middle part of Lithuania, in the period 2009- 2011, on hydro-ameliorated Gleyic Podzoluvisol soil and hydro-ameliorated Hypogleyic Luvisol soil. The results show that the drainage discharge and its duration depended on the amount and distribution of precipitation during the study period.

Key words: *Precipitation, Pipe spacing, Drainage runoff, Surplus soil water.*

WATER FOOTPRINT OF FOOD PRODUCTION AND CONSUMPTION IN LITHUANIA

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Abstract

One of the greatest constraints of food production is freshwater availability. This problem is exacerbated by climate change. One part of the solution to the problem of limited water resources is to adjust consumption and production patterns. The water footprint (WF) is a metric of consumptive water use introduced to improve the understanding of production–consumption linkages. The review paper aims to explore food-related WF in Lithuania. It also sheds light on the implications of agricultural production systems as well as on the current food consumption patterns in the country in terms of WF. Data from the Water Footprint Network show that total WF of consumption in Lithuania was 5,300 million m^3 in 2011 i.e. 4,200 l/capita/day, of which just about a quarter is external. Crop production is the most important contributor to WF of production, while agricultural products are also the most important contributors to WF of consumption. Green water is the most important component of WF of crop production, WF of consumption of agricultural products as well as total WF of consumption. The WF concept shows the importance of consumption patterns and good governance in the water management science. Adopting a water footprint perspective can help not only in reducing pressure on water resources in Lithuania but also in making Lithuanian agricultural and food systems more resilient and adapted to climate change. The adoption of more sustainable food production systems and consumption patterns is important not only to promote the health of the Lithuanian citizens but also to reduce pressure on country's natural resources. That entails, *inter alia*, increasing resource use efficiency and productivity through sustainable intensification, reducing waste, and moderating diets.

Key words: *Water footprint, Water resources, Agriculture, Food waste, Lithuania.*

IMPACT OF CLIMATE CHANGE AND RENEWABLE ENERGY USE ON WATER RESOURCES

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Abstract

The pressure on energy in general and electricity in particular has become very important. This growing demand for energy is the result of a hydro-agricultural development policy launched since the sixties by the Moroccan government, which focused on the intensive use of energy use for pumping water irrigation. This increasing energy demand is also due to urban and rural electrification (ADEREE 2014). The use of energy is essential to agriculture which is considered as the main sector of the economic development. This paper simulates the impact of Climate Change and the use of renewable energy on water resources in the region of Souss Massa using a dynamic integrated water management model (Elame and al. 2012, Elame and al. 2015). To assess the impact of pumping costs and climate change on water resources use, a simulation was conducted and was based on a comparison of water pumping costs. These costs are introduced in the dynamic model and compared to the pumping cost by solar energy**.** The results show that the average shadow price of water remains below 3 dh / m^3 the first five years knowing that it has already exceeded 5 Dirhams per cubic meter (dh/m^3) compared to scenario A, which assesses only the impact of climate change. Changing economic price for the two scenarios (A, B) follows the same trend with a difference of 2 (dh/m^3) less in case of the use of solar energy (scenario B). The economic price directly influences the amount consumed for irrigation. Indeed, there is a 17% reduction in the use of surface water resources. This amount will be offset by an increase of groundwater use because their operating cost become more competitive. Add to that, the small decrease in the total value added or even a recorded increase in the first five years, despite the impact of climate change. This increasing of the value added is explained by the gain on pumping costs by using solar energy. This study has shown the potential impact of the use of renewable energy on reducing pumping costs and thus for the use of water resources in general. Furthermore, the use of this energy source can reduce energy dependence vis-à-vis the International market and reduce also its impact on the trade balance.

Keywords: *renewable energy, agriculture, water, climate change, irrigation, economic price.*

AN ASSESSMENT OF THE TRANSFER OF METAL TRACE ELEMENTS TO SPONTANEOUS PLANTS: A POTENTIAL APPLICATION FOR PHYTOSTABILIATION OF PHOSPHATE LIMESTONE WASTE

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Abstract

The abandoned Kettara mine, located 30 km northwest of Marrakech, is an example of an area contaminated with heavy metals (HM). The production of acid mine drainage (AMD) is a major problem of this mine. For the rehabilitation of the site, a hydrogeological cover system made of phosphate limestone wastes (waste rocks and phosphate sludge), was conducted to allow the reduction of the infiltration of water, and even the reduction of the AMD. However, this phosphate structure has to be covered with selected plants to assure its long-term efficiency1. Candidate plants must ensure a physical stabilization of the phosphate cover without allowing the transfer of toxic MTEs into the food chain. In this study, the spontaneous vegetation of the phosphate cover and from contaminated soil in their vicinity are studied, in order to select plants which would increase efficiency of phosphate cover. Other selection factors (root length, life-form) are important to consider for the selection of candidate species. The MTE: As, Ba, Cd, Co, Cu, Mn, Pb, Ti, V, Zn, are analyzed with ICP in the dominant plants and rhizospheric soils from six sites of phosphates cover and from contaminated soil in their vicinity. The results showed that the phosphates cover contains high concentrations of Cr, Cu, and Cd. The soils contain high levels of heavy metals such as Cu, Pb, and V, and more lightly than the environmental quality standard in soils. The heavy metals contain in plants collected from phosphates cover and contaminated soils showed that there were no hyperaccumulator plants, and accumulated lower concentrations of heavy metals in shoots and roots. *Aizoon hispanicum, Cleome brachycarpa, Anacyclus valentines, Festuca ovina, Colocynthis vulgaris, Scolymus hispanicus, Herniaria cinerea, Asphodelus tenuifolius, Plantago afra, Eryngium ilicifolium, and Aizoon canariense*, had bioconcentration factors (BFs) greater than 1, and a weak TF, demonstrating a high tolerance to heavy metals. The species presented a short root system, and had a perennial life-form. Therefore, they are good candidates for phytostabilization of the phosphates cover. Furthermore detailed studies are needed to investigate the phytostabilization potential of these species in pot culture and field researches.

Keywords: *Mine, Phosphates, Plants, Soils, Phytostabilisation.*

WATER AND SOIL CONSERVATION TECHNIQUES, FACING HUMAN CONSTRAINTS IN THE ATLANTIC PLATEAUS OF MOROCCO

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Abstract

Despite its location in the more favourable parts of Morocco in terms of climatic conditions, the semi-arid plateaus of the Atlantic coast consists of marginal land with a high poverty and important indicators of degradation. There are, however, several measures, like assisted regeneration of cork oak in forest land, crop rotation in the rainfed agro-pastoral, ploughing along the contours which signify the will to restore soil fertility and reduce soil degradation. Nevertheless, the indicators of degradation are much more important than those of conservation. In our study area, the signs of degradation are important, but there is a high potential for sustainable land management. However, the human constraints face this management. The goal of this paper is to select the more promising options for management and to find solutions for their implementation, which means how to minimize their constraints. Results of research showed that the techniques implemented (Gullies correction by atriplex plantation, Mulching and minimum tillage) presents the advantages following: 1. Decrease of the erosion rate from >50t/ha/y to <10t/ha/y. 2. Increase of biomass: from 10 to 25 times after 10 years implementation. 3. Economic profit on the long term: Reduction of the need for stubble from the croplands and for forest grazing. 4. Offsite hydrological effect (decrease of reservoir siltation), due to gullies cicatrisation. The stakeholders meetings showed the importance of bringing solutions to this degradation trend, which threats both the environment and the farmers' income. The choice for more integration between croplands and pastures represents the less costly and the most profitable option.

Keywords: *Sustainable land management, Environment protection, human constraints*.

AN ASSESSMENT OF CLIMATE INFORMATION NEEDS OF SMALL ARABLE FARMERS IN FLOOD-PRONE AREAS OF OGUN-STATE, NIGERIA

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Abstract

The growing problem of climatic change impacts is global and the developing countries, including Nigeria, have been mostly affected. Timely weather and climate information service (CIS) are fundamental means of improving agricultural productivity, managing risks, and bolstering climate resilience. This calls for a need for weather information that farmers would use to adapt the impacts of climate change at local level. This study assessed climate information needs of smallholder arable crop farmers in flood-prone areas of Ogun-State, Nigeria. A purposive sampling technique was used to select 65 respondents from 10 communities in the study area. Primary data for the study were obtained with the use of a structured interview guide while Global Positioning System (GPS) mapping was used to identify the proximity of the communities to the River Ogun. The findings revealed that the majority of the farmers (89.00%) were male with less than half (38.50%) being literate. The GPS mapping revealed that 78.55% of the communities were less than 1 km away from the major river. Climate information services that were highly needed by farmers were periodic weather outlook for planning planting operation ($\bar{x}$ = 3.74) and flood alert ($\bar{x}$ = 3.82). The most preferred means of CIS to the farmers were Small Medium Messages on mobile phone in the indigenous language ($\bar{x}$ = 3. 67). The study concluded that both the government and private organizations should invest in providing climate information service in the study area.

Key words: *Climate change, climate information service, information needs, flood, arable farmers, Nigeria.*

PROTECTING GROUND WATER RESOURCES FROM TANNERIES CONTAMINATION: A STEP TOWARDS SUSTAINABLE SOLUTIONS

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Abstract

Serious health and environmental impacts are posed by the excessive use of Chromium and other chemicals in Tannery operations in Pakistan. Ground water is being contaminated as the effluents are discharged directly on ground or in water bodies, without being treated. Tanning process involves the excessive use of water and chemicals. During the process more than 85% of the chemicals are not taken up by the leather and becomes part of runoff. The effluent loaded with chemicals is discharged into nearby water channels ie sewage drain or canal. This effluent is a continuous source of underground water contamination and also a risk for the animals and plants living in freshwater. The water is being used for drinking and irrigation purposes, hence directly affecting the drinking water quality and soil. In order to control the discharge of heavily polluted wastewater and to reduce the production/ treatment costs, "Cleaner Production Center" initiated Trade Development Authority of Pakistan in collaboration with Pakistan Gloves Manufacturers Association, Sialkot with the technical assistance of Norwegian Agency for Co-operation and Development (NORAD). The center came up with environmental friendly solutions to contribute in water quality and conservation. The applied techniques resulted in 25% less than usual water consumption. Moreover this low cost chrome recovery/treatment cost is very low just to give an incentive for the tannery owners. The recovered chrome is available at 50% less cost than usual, to be reused in tanneries.

Keywords: *Underground water contamination, Chrome recovery, effluent, Cleaner Production Center.*

NATURAL ABUNDANCE OF ^{13}C IN TWO RICE SYSTEMS IN THAILAND

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Abstract

Crops and land use patterns define carbon (C) sequestration potential of agricultural systems. However, natural abundance of ^{13}C in two rice systems: a system of rice intensification (SRI) and a conventional system of rice cultivation (CS) has been still unexplained in Thailand. In current study, 192 samples (96 SRI and 96 CS) were collected from three rice growing districts in Nakhon Pathom province after crop harvest, at 0–20 cm and analyzed for ^{13}C, soil organic matter (SOM), soil total nitrogen (TN), and soil organic carbon (SOC). The results showed that in Nakhon Pathom province natural abundance of ^{13}C was higher in SRI than in CS with the values of $\delta\ ^{13}C$ ranged from -15.90‰ to -21.60‰ and -21.7‰ to -25.97‰ in SRI and CS, respectively. SOM ranged from 4.17-6.03 in SRI and 3.47-4.70 percent in SRI and CS, respectively. Among the studied sites, Sam Phran in SRI retained maximum SOM (6.03%) in 0-20 cm soil depth while minimum (3.47%) was observed in Phuttamonthon in CS. The highest TN content (0.32 g Kg^{-1}) in SRI was recorded in Sam Pathom while lowest TN (0.14 g kg^{-1}) was found in Phuttamonthon in CS. Comparative soil analysis data showed a strong influence of agricultural practices on C dynamics in all three districts. Maximum SOC (6.03 g kg^{-1}) was observed in Sam Phran district in SRI while lowest (1.33 g Kg^{-1}) was seen in Phuttamonthon in CS. As a whole, in SRI, 52, 34 and 65% increase over CS in SOC was observed in Nakhon Chai Si, Sam Phran and Phuttamonthon, respectively. It is suggested that intermittent irrigation, plant spacing, clay contents and crop residues addition play a significant role in more C sequestration in SRI soils.

Key words: *Cultivation systems, SRI, Carbon sequestration, Paddy field, Greenhouse gases.*

ELEMENTOLOGY OF ECONOMICALLY IMPORTANT INDEGINOUS MEDICINAL PLANTS SPECIES IN DISTRICT SHANGLA (PAKISTAN)

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Abstract

District Shanglais located in the Khyber-Pakhtunkhwa province of Pakistan, in the Himalayan mountain ranges and is unique for its diverse flora. Shangla is rich in medicinally important plant species. Four, economically most important selected medicinal plant species of Shangla (*Morchellae sculenta L, Daetylorhizahatogirea, Podophyllumemodi wall* and *Aconitum hetrophyllum*) were analyzed in Pakistan Council of Scientific and Industrial Research (PCSIR) Laboratories Complex, Peshawar to find out Macro nutrients (Ca, Mg, Na and K) and micro nutrients (Cu, Fe, Mn, Zn). The results revealed that Ca was found maximum (5817.6 Mg/L) in *Aconitum hetrophyllum* and minimum (678.72 Mg/L) in *Dactylorhizahatagirea*;Mgwas found maximum (2327.9 Mg/L) in *Podophyllumemodi* W and minimum (950.00 Mg/L) in *Dactylorhizahatagirea*; Nawas found maximum (1330.00 Mg/L) in *Morchellaesculenta. L* and minimum (340.00 Mg/L) in *Aconitum hetrophyllum*; K was found maximum (54000.00 Mg/L) in *Morchellaesculenta. L* and minimum (12500.00 Mg/L) in *Podophyllumemodi*W; Cu was found maximum (50.00 Mg/L) in *Morchellaesculenta. L* and minimum (9.00 Mg/L) in*Dactylorhizahatagirea*; Fe was found maximum (4400.00 Mg/L) in *Aconitum hetrophyllum* and minimum (1237.00 Mg/L) in *Morchellaesculenta. L*;Mnwas found maximum (300.00 Mg/L) in *Podophyllumemodi* W and minimum (32.00 Mg/L) in *Dactylorhizahatagirea*; Zn was found maximum (190.00 Mg/L) in *Morchellaesculenta. L* and minimum (41.00 Mg/L) in *Dactylorhizahatagirea*. Based on these findings plant species can be recommended for different nutrients deficiency syndromes.

Keywords: *Shangla, Medicinallyl Important species, Elemental Analysis.*

ANALYSIS OF PLANT COMMUNITIES GROWING IN SMALL WETLAND AREAS IN MEADOWS

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Abstract

The aim of the experiment was to assess the role of meadow wetlands in preserving the variety of plants both as individual species and as plant communities. Field research was carried out between 2008 and 2011 in meadow depressions of the Siedlce Plateau in east-central Poland. The area of the reservoirs ranged from 2700 m^2 to 850 m^2. To assess plant communities homogeneous plots were selected and phytosociological releves were done using the Braun-Blanquet method. The research involved not only plant inventory but also vegetation community analysis together with its classification. Among the plants growing near meadow ponds are species typical for peat bogs and alder swamp woods but also for fresh and moderately wet meadows or common in bulrush plant areas. The ecosystems studied in the research consisted of a wide variety of rare or endangered species with a considerable diversity in plant communities. The class *Phragmitetea* represented the most numerous group, which is a proof that the wetlands gradually evolve to dry land. The research showed that small water reservoirs in meadows are important in preserving biodiversity among plants and in maintaining plant communities. Moreover, those reservoirs, connecting fragmented ecosystems, are also elements of ecological corridors.

Keywords: *Phragmitetea, Braun-Blanquet method, meadow, ecosystems.*

BIOTECHNOLOGICAL FILTERS AS A TOOL FOR SUSTAINABLE WATER MANAGEMENT

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Abstract

Biotechnological filters are designed for wastewater treatment and removal of biogenic elements responsible for eutrophication processes. They are also useful for removal of biogenic elements and organic waste (municipal and agricultural wastewater) from flowing water (small watercourses to IV row). Developed filters have two very important features that differentiate them from other solutions: among everything else – several types of filter materials (a combination of organic and geochemical substrates and appropriate microorganisms) and the fact that they are placed in standard housings that can be configured in filter devices according to the needs. In every case the filter is individually designed in order to optimize the treatment in specific conditions depending on wastewater load and requirements regarding the purification degree. The individualization of filters comes as a result of selecting appropriate filter cartridges, their quantity and retention chambers before and between filters. Depending on the needs, zones with retention chambers can be multiplied to achieve the assumed level of purification. The device can be installed quickly; it is relatively cheap and has a positive effect on the environment within a month from its installation. The whole system does not consume any energy during the operation, but the maintenance is limited to replacing filter cartridges in the filter units (gabions are not exchangeable).

Key words: *Biotechnological filter, water protection, sustainable water management, eutrophication, biogenic elements, ecohydrology*.

IMPACT OF DICLOFENAC AND METOPROLOL ON OXIDATIVE STRESS PARAMETERS INALBA SEEDLINGS SINAPSIS

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Abstract

Pharmaceuticals and personal care products (PPCPs) are of significant environmental concern due to their large use volumes and continuous emission into the environment. The human use of PPCPs results in their collection at wastewater treatment plants (WWTPs). Diclofenac and metoprolol are among the most frequently detected drugs in aquatic ecosystems. Their concentrations in surface water range from ng/L to tens of μg/L. Higher concentrations have been detected in developing countries due to the direct discharge of untreated wastewater from residences and hospitals into surface waters. The production of reactive oxygen species (ROS), which are associated with the direct damage of various biomolecules, and subsequent alterations in plant cell redox state and antioxidant mechanisms are usually the first responses to environmental stress. The aim of the present study was to assess if Sinapsis alba can be influenced by environmentally-relevant concentrations of diclofenac and metoprolol, and which relevant physiological and biochemical markers at plant or tissue level can be considered as early and sensitive stress indicators. Reduction in *Sinapsis alba* biomass production induced by 14-day exposure to diclofenac and metoprolol (1; 2,5; 5μg/L) were observed. Content of thiobarbituric acid reactive substances (TBARS) and hydrogen peroxide (H_2O_2) increased with increasing concentration of diclofenac. Diclofenac in concentration of 5 μg/L led to increase in TBARS content by 56% and H_2O_2 by 32%. Catalase activity was elevated by both pharmaceuticals (metoprolol in highest concentration increase enzyme activity by 156% as compared to control). The present findings suggest that the exposure to environmentally relevant concentrations of pharmaceuticals (diclofenac and metoprolol) affects biochemical processes of *Sinapsis alba* plants via formation of ROS that results in enhanced lipid peroxidation, loss of the plasma membrane integrity, and changes in antioxidant systems prior to the appearance of any physiological and growth responses.

Keywords: *diclofenac, metoprolol, oxidative stress,pharamceuticals, TBARS.*

SALIX ERIOCEPHALA WILLOW ANTIOXIDANT PROPERTIES INVOLVED IN TOLERANCE TO HEAVY METALS

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Abstract

Environmental pollution caused by heavy metals, as an effect of agricultural and industrial activities, is a major problem in the world. Heavy metals may be toxic to plant growth and metabolism, but some plants cumulate that without symptoms of toxicity. An unavoidable consequence of heavy metals excess in plant tissues is production of highly reactive oxygen species (ROS), which disturb cellular redox environment causing oxidative stress. Scavenging or detoxification of ROS excess is achieved by the efficient antioxidative systems including antioxidative enzymes and non-enzymatic antioxidants. The premise of this study was to determine those properties, which might be involved in the mechanisms of willow (*Salix*) tolerance to heavy metals. The response of one-year-old cuttings of *Salix eriocephala* growing in hydroponic cultures, exposed to cadmium and zinc ions in 0,5 mM and 1,5 mM concentrations was studied. Differences in the level of glutathione, ascorbate, and flavonoids were observed. The changes also concerned the level of total phenolic compounds and total antioxidant capacity. Simultaneously, the activation of antioxidant pathway enzymes, ascorbate and guaiacol peroxidase, catalase and superoxide dismutase was noted.

Keywords: *Salix eriocephala, anioxidant properties, heavy metals.*

STUDY OF SOIL EROSION DEGRADATION PROCESSES IN HYDROGRAPHIC BASIN BECIULUI VALEY, BUZAU COUNTY IN ROMANIA

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Abstract

Valea Beciului River Basin in Romania covers an area of 184.3 ha, of which 38.3 ha are situated on land with a slope of over 35%. The present state of soil degradation in the catchment area is a consequence of anthropogenic intervention through unreasonable exploitation of resources. Years ago, part of the 10-15% slope category was used as arable land. The intensification of erosion degradation processes has led to the change of agricultural use in pasture, with pastoral exhumation and with socio-economic consequences for the rural population in the area. A conclusive picture of the state of soil degradation is given by the quantitative estimation of eroded soil pirders. For this, studies on the characteristics of the natural framework and the pedological mapping, which provide basic data, were required. Improving the degradation state can be done by restoring the vegetal carpet and organizing the territory, which is the basic work.

Key words: *hydrographic basin, soil erosion, soil degradation.*

SOME ASPECTS REGARDING MANAGEMENT OF PROTECTED AREAS IN ROMANIA

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Abstract

Considered a central part of strategies of preservation of global biodiversity, protected areas play a crucial role in the development of sustainable human activities, and are considered as really effective instruments, economic and sustainable in combating climate change. Management of protected areas is a key element for achieving the objective for which they were designated the protected areas - conservation and protection of nature and cultural values. With numerous areas of national, international and community interest, Romania has the most diverse and valuable natural heritage in Europe (Danube Delta - Biosphere Reserve, 13 national parks, 14 natural parks and 273 Nature 2000 sites, two scientific reserves and numerous monuments of nature). Protected areas on the Romanian territory have a heritage, scientific and recreational value. Romania enjoys an exceptional heritage, in 2014 the total surface of protected areas had 23.8% of the total. This entails a duty to manage these areas in order to preserve natural and cultural values, and even contribute to their sustainable development. In this paper are presented aspects related to management of protected areas, the entities responsible, ways and means to manage protected areas and categories of protected areas in Romania.

Keywords: *Protected areas, Management, Romania.*

SUNFLOWER BIODIVERSITY OF COLEOPTERA AND HYMENOPTERA IN SOME AREAS OF ROMANIA LOWLAND

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Abstract

Sunflower is the second crop of economic importance for Romanian agriculture, being in 2014 cultivated on over 993.4 thousand ha which had registered a rising with 52.34% in comparison with last century (520 thousand ha in 1983) and the production was of 2.1 million tons of this agricultural product in EU in 2014. The paper present the results obtained from a study which was carried out in the period 2000-2015 in 6 Romanian districts from the south lowland area. The insects from Coleoptera order represent important elements of biodiversity in the agrosystem of sunflower through the number, density and trophodynamic module role. Our study presents the data related to the fauna of coleopterans and the important group of pollinators from Hymenoptera order structure, taxonomic lists, density dynamic and relative abundances values and other ecological considerations regarding mean pests and beneficial populations in the area of investigations.

Keywords: *biodiversity, Coleoptera, Hymenoptera, sunflower.*

INFLUENCE OF ROOTING SUBSTRATE FOR SOME ORNAMENTAL SHRUBS FROM BOTANICAL GARDEN AL. BUIA, CRAIOVA (ROMANIA)

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Abstract

As it is well known, green areas, parks, gardens, squares and recreational areas are an attribute of modern development and a source of oxygen. Through the studies and researches carried out in the present paper we tried to highlight the rooting substrate consisting of: sand, perlite and perlite + sand on some ornamental wood species: *Spiraea vanhouttei* Zab. Fam. *Rosaceae, Forsythia intermedia* Zab. Fam. *Oleaceae, Deutz gracilis* Siebold & amp; Zucc. Fam. *Hydrangeaceae*. The production of ornamental shrubs can be done in specially constructed nurseries as well as in protected areas. In order to obtain new ornamental plants at the Botanical Garden "Al. Buia" from Craiova the vegetative propagation method has been used.

Keywords: *Rooting substrate, Spirea vanhoutei Zabil., Forsithia intermedia Zab., Deutz gracilis Siebold &amp.*

ORGANIZATION OF AGRICULTURAL PRODUCTION ON KOLUBARA COAL MINES DEPOSOLS, ENVIRONMENTAL FUNCTION

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Abstract

Surface mining of coal leads to the disappearance of thousands of hectares of agricultural land. This has disrupted the ecosystem of the area, and therefore the environment. The newly formed anthropogenic land was formed by depositing different materials mosaic spatially distributed. They are very heterogeneous, with poor agricultural properties. Organized agricultural production on deposals was not based on economic principles, but primarily to protect the environment. Agricultural production on these areas contributes significantly to reducing the overall negative effects of surface coal mining. This paper aims to show that on the soil substrates, respectively deposals, it is possible to successfully organize agricultural production and to contribute to environmental protection in the areas that are affected by surface coal mining.

Keywords: *surface mines "Kolubara", barren soil, recultivation, agricultural production, environmental protection.*

INFLUENCE OF EMBANKMENT ON THE SEASONAL ZOOPLANKTON DYNAMIC IN AGRICULTURAL LAND

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Abstract

The research was perfomed in the southeastern part of Slovakia in the catchment area of Latorica river. Monitored area was devided into the area inside the embankment (near by Latorica river) and the outside of the embankment (the area of agricultural land used for cattle grazing). During the two years was altogether detected 118 taxons of zooplankton, from that 76 taxons of Rotatoria, 32 taxons of Cladocera and 10 taxons of Copepoda. A part of the research was to watch the physico-chemical and hydrological indicators and to determine monthly P/B coefficient for the dominant species *Bosmina longirostris* (O.F.Müller, 1785). Zooplankton inside the embankment was the most affected by flood.Species diversity in locality in the area outside of the embankment was lower (61 taxons) compared to the localities in the area inside the embankment (107 taxons). High quantity of taxons in the area inside the embankment was the effect of supply by river during the flood. A limiting factor of zooplankton development was the influence of floods, which are accompanied by increased turbidity. The floods had inhibitory effect on the abundance of zooplankton. The abundance of zooplankton during the floods was extremely low, 24,5 n.l-1 in average. Flood period was followed by radip increase of quantitative and qualitative zooplankton composition. The abundance in periods after floods reached 178,4 n.l-1 in average.

Key words: *zooplankton, flood, embankment, agricultural land.*

PHYTOSYNTHESIS OF NON-SPHERICAL METAL NANOPARTICLES BY USING EXTRACTS OF SELECTED PLANTS

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Abstract

Nanotechnology is a new fascinating field of science which opens the opportunities for discoveries in the field of biotechnology, electronics, energy, medicine and life sciences. Nanoparticles also can find application as nano-pesticide fertilizers and herbicides. It is already known that properties of nanoparticles depend on size and shape. Therefore, there is an interest in development of simple, low-cost and non-toxic methods for controlled synthesis of metal nanoparticles. Plant extracts contains both reducing and capping components for formation stable metal (silver, gold, copper etc.) nanoparticles. In the present study, we present different variations of the phytosyntheses of metal nanoparticles through the bio-reduction of silver/copper nitrite and tetrachloroauric acid using plant extracts and the effect of plant extracts on the shape of nanoparticles. Nanoparticles were characterized using UV-Visible absorption spectroscopy, infra-red spectroscopy (FTIR), EDX, high resolution transmission electron spectroscopy (HR-TEM), and X-ray diffraction (XRD). Extracts of some plants offer low-cost and nontoxic capping agents for formation of highly anisotropic metallic nanoparticles (nanoprisms and nanorods). The products of green synthesis depend on factors such as the external conditions of the reaction (e.g. temperature, pressure), reaction time, pH and extract constituents, which permit the formation and stability of the nanoparticles. UV-Visible absorption spectra of obtained nanoparticles shows two bands at around 530-560 and 750-1050 nm, which results from transverse and longitudinal surface plasmon resonance respectively. Therefore, row extracts were fractioned into several parts according to polarity by liquid-liquid extraction with various solvents with aim to find the capping agent. We have obtained the nanoparticles with different shapes and size. Spherical nanoparticles are represented by spherical shape with range 8-35 nm and non-spherical nanoparticles presented by triangular nanoprisms and nanorods (up to 118 nm long).

Keywords: *green synthesis, biosynthesis, irregular shape, nanomaterials, Melissa officinalis L., Mentha piperita L.*

PHYTOSYNTHESIS OF SILVER AND GOLD NANOPARTICLES BY USING EXTRACTS OF BLACKCURRANT AND ELDERBERRY

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Abstract

Metallic and oxide nanoparticles are finding new applications in optics, electronics as well as pharmaceutical, medical, food and agriculture sectors. Biomolecules present in berries extracts presents a significant potential to be used to reduce metal ions to nanoparticles in a single-step green synthesis process. The reduction and stabilisation of metallic nanoparticles flows quite fast, readily conducted at room temperature and pressure, and the production can be easily scaled up. Despite the large number of publications related to phytosynthesis of nanoparticles, the role of different water soluble plant metabolites (e.g. alkaloids, phenolic compounds, terpenoids) and co-enzymes is still not understood completely. A green synthesis method rot the preparation of silver and gold nanoparticles using extracts of polyphenolic-rich berries is reported in the present investigation. Polyphenolic compounds were extracted from blackcurrant and elderberry fruits by using ethanol-water solution acidified with acetic acid. Then, extract was purified by solid phase extraction with silica gel C_{18} adsorbent to remove water solvable compounds (sugars, organic acids, non-phenolic dyes etc.). The compositions of phenolic samples were characterized by differential UV-Visible spectroscopy and LCMS. Nanoparticles of silver and gold were synthesized in water solutions by reacting of $AgNO_3$ and $HAuCl_4$ with polyphenolic samplesat various conditions (temperature, pH, concentration etc.) and studied by using UV-Vis spectrophotometry, X-ray diffraction, and infra-red spectroscopy (FTIR).

Keywords: *green synthesis, polyphenolics, nanoparticles, Sambucusnigra, Ribes nigrum.*

Acknowledgement

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DESIGNING AND BEHAVIOR ANALYZING OF IRRIGATION NETWORKS OPERATING ON DEMAND UNDER DEVELOPING COUNTRIES' CONDITIONS

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Abstract

Throughout our long experiment in the operation of irrigation networks in Syria, we had faced many constrains that made the operation of the irrigation networks have its own specialty. I believe that most of the developing countries is suffering the same difficulties in the process of operating the irrigation networks. Among these difficulties, the most important one is the relatively poor knowledge of the farmer, absence of the preserving laws and absence of the confidence between farmer and the government(utility responsible of the irrigation process). This issues makes the irrigation process randomly achieved as farmer have doubts about irrigation dates, irrigation regime and sustainability of water resources. Therefore, farmer irrigates his land continuously whenever water is available, without any responsibility or interest of irrigation schedules and water demand of crops. Farmer deliver water for his land whenever he decides without any concern of irrigation rules and he always does an aggressive action towards utility staff and other neighbor farmers. Farmer often tends to damage irrigation structure and network. This specialty in the developing countries requires specialty of irrigation networks design, that takes into account the random operating, water shed ,and ensuring required water and head for all hydrants. Designing irrigation networks that work "on demand" taking into account the mentioned conditions is relatively an acceptable solution and may be the only solution for these regions. In this paper we explain designing and behavior analyzing of irrigation networks that operating on demand in developing countries conditions. As well as explain the role of Water Use Association to enhance the farmer trust.

Keywords: *Operating on demand, Irrigation networks. alkhayer Iyad.*

ISOLATION OF CELLULASE PRODUCING MICROBES AND NITROGEN FIXING BACTERIA FROM BAMBOO SOILS

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Abstract

In organic agriculture, organic compost is not only an essential source of nutrient for plant but also a substrate for improving soil physical conditions. To make low-cost organic compost produced from agricultural waste or crop residue, effective microorganisms with the capacity to decompose the cellulosic substrates was the aim in this study. It has been observed that fallen bamboo leaves are decomposed very quickly possibly as a result of microbial activity. The area at Huaysatyai, Hua-Hin, ***Prachuap*** Khiri Khan, Thailand, is a remote and conserved area where the native bamboo is plentiful. The isolation and screening of the beneficial microbes from 25 soil samples taken under the bamboo canopy yielded 72 bacterial and 44 fungal isolates with the capacity to degrade Carboxymethyl cellulose (CMC) on Na-CMC medium. *Bacillus subtilis* subsp. *inaquosorum* (S13-5) and *Penicillium restrictum* (SF24-6) were most effective in cellulase production at 0.210 and 0.436 IU/ml, respectively. From 32 isolates, *Bacillus subtilis* subsp. *inaquosorum* (S5NN1-1) and *B. safensis* (S2NN5-1) were effective in fixing nitrogen based on the test on nitrogen free malate (NM) medium. Thus, bamboo soil is a source of beneficial microbes that they will prepare as microbial seed inoculants to improve crop performance.

Keywords: *Compost, Soil, Bacillus, Penicillium.*

ENVIRONMENTAL PROTECTION AND MANAGEMENT OF RESOURCES IN TUNISIA

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Abstract

There is a range of environmental problems including soil erosion, climate change, combined by human activities, development processes such as industrialization, urbanization and population growth. Consequently, Tunisia is emerging from the inevitable conflicts between environmental protection on the one hand and sustainable development on the other. The background of the development of environmental protection in Tunisia has been reviewed. The potential effect of environmental laws and awareness on the environment has been appraised based on observations gathered during field visits in 2005 and 2017. The majority of the field sites provided positive examples for the Tunisian environmental programme.

Key words: *Environmental protection, resources, Tunisia.*

DETERMINATION OF HEAT PROPERTIES OF SOILS UNDER SOYBEAN PLANT COVER WITH 1 AND 2 HARMONIC BOUNDARY CONDITIONS

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Abstract

Soil heat diffusivity is an important physical parameter affecting soil temperature. Several algorithms have been proposed to estimate soil thermal diffusivity. Soil heat diffusivity is determined in laboratory and field by monitoring the soil temperature. Commonly used methods for finding this parameter is based on via application of analytical and numerical solution of heat conduction equation to data from field trials. This study presents comparisons between six algorithms used in the calculation of apparent thermal diffusivity (κ) of the topsoil measurements which were conducted at Çumra site in Turkey. Soil temperatures were measured at depths of 0.05 m and 0.10 m. We modeled soil temperature and κ using six different methods; namely layer methods (i.e. Amplitude, Phase, Arctangent, Logarithm), point1 method, and point2 method. The point methods outperformed the layer methods in all the cases. The layer method over predicted the soil temperature in all depths under all the soil surface conditions. Point 1 and point 2 methods estimated more reasonable values and their results were consistent in majority of the cases. This success of the point methods was attributed to the initial conditions on soil surface that they employ. The layer method uses the initial conditions T (∞, t)=0, while the point methods use initial conditions $\partial T(L,t)/\partial x=0$. In addition, the analytical solutions used in point methods better account to the heat flow dynamics in soils.

Key words: *Soil Thermal Properties, Mathematical Modelling, Heat Diffusivity, Heat Conductivity, Boundary Conditions.*

EVALUATION OF PLANT WASTE MANAGEMENT IN TURKEY

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Abstract

Providing waste managament in a proper way and waste controlling are very important issues in developed countries in the 21st century. There are studies about recycling of agricultural wastes by eco-friendly methods, being used as organic matter source and substrate, and studies about the benefits of recycled wastes to the environment, economy and human health. In Turkey, quantity of total waste is increased 57% in the period 1994-2014. Most of these wastes are burned or sent to municipiality garbages and without recycyling. Only 1% of wastes are send to compost facilities. Evaluation of plant based wastes with suitable techniques has economic and ecological importance. In this study, the economic benefits of the disposal of these wastes will be investigated by examining the disposal methods of agricultural wastes. The advantages and disadvantages of the methods used in the conversion of plant wastes will be determined. The contribution of the recycling of agricultural wastes to the economy will be examined too. Besides, the cost of recycling will be estimated and the market price comparison of the recycled products will be made. Furthermore, the factors affecting the possibilities of the usage of plant based wastes in Turkey will be determined by the regression analysis and policy proposals will be discussed.

Keywords: *Waste, agricultural policy, recycling.*

CARBON SEQUESTRATION IN AGRO-ECOSYSTEM: AN APPRAISAL ASSOCIATED WITH SOIL STRUCTURE

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Abstract

To combat climate change, it is focusing on the elimination of the greenhouse effect, which causes global warming. Since this effect originates from a number of gases known as greenhouse gases, the fight against the atmospheric release of these gases is becoming important. Greenhouse gas that is the busiest on the agenda is carbon dioxide. Thus, carbon sequestration is very popular subject for different disciplines. Carbon sequestration in the soil means that the soil organic matter is trapped in the aggregates and protected against microbial attacks. The organic matter retained in the aggregate also plays a role in the formation of that aggregate. Organic matter which is now in the structure of the aggregate remains without breaking up increases the durability of the aggregate. So the durability of the aggregate also makes a positive impact on C sequestration. Since the mechanism of aggregate formation in the soil takes place hierarchically, the organic matter is in fact both within the aggregate and between the aggregates. The formation and breakdown of aggregates in the soil and the decomposition of organic matter are influenced by management practices such as tillage, irrigation, fertilization, choice of product pattern and so on. Carbon sequestration in the soil is an extremely complex issue and has not been fully clarified since it is influenced by both the hierarchical aggregate formation mechanism and the management practices. In this appraisal, carbon sequestration in the soil was reviewed through soil structural formation and management practice.

Key words: *Aggregate, Agriculture, Carbon sequestration, Soil, Structure.*

ESTIMATION OF SOIL TEMPERATURE IN THE MIDDLE BLACK SEA REGION OF TURKEY BY ARTIFICIAL NEURAL NETWORK

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Abstract

In this study, artificial neural network (ANN) models were developed to predict soil temperatures at 5, 10, 20, 30, 50 and 100 cm depth in the Middle Black Sea region of Turkey. The soil temperature and other meteorological parameters were obtained between the years of 1971 and 2015 by the Turkish State Meteorological Service (TSMS). Three input parameters (depth of soil, air temperature and month) were used to evaluate the average monthly soil temperature,. The obtained 540 data were divided into training (240 data), testing (120 data) and validation (180 data) sets during neuro computing. ANN model was devised using MATLAB programming. The results of ANN model were compared with measured data on the basis of determination coefficient (R^2), root mean square error (RMSE) and mean absolute error (MAE) in order to evaluate performance of developed model. The ANN model for all data sets gave best results with R^2, RMSE and MAE values in the ranged 0.854-0.994, 0.240-3.74 ^oC and 0.011-2.333^oC, respectively.

Keywords: *Soil temperature, Model, Artificial neural network, Black sea.*

EVALUATION OF CHANGES IN TOTAL RICE PRODUCTION AREA OF BAFRA PLAINS WITHIN THE LAST 25 YEARS

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Abstract

Bafra plain is one of the important agricultural area of Turkey with an important production potential of many vegetables and field crops such as tomatoes, pepper, water melon, maize, wheat and rice. Altınkaya dam constructed on the Red River is the main water resource of irrigation scheme of Bafra Plain. Moreover, Bafra Plain has an important habitat environment for many kinds of birds with a large wetland which is a significant part of water budget of this area. According to agricultural statistics, the ratio of total area of rice production to total agricultural lands in Bafra Plain was increased recently due to new irrigation infrastructure and agricultural economic conditions. However, this trend is a menace for environmental and agricultural conditions which are in relationship with water use from the irrigation scheme and soil water table. The aims of this study are to achieve mapping rice production area by distinguishing this crop from the others and to determine the rate of increase between 1990 and 2015. For this purpose images of Landsat 8 satellite were used which acquired for critical phenological stages of rice crop for the study period. Results showed that, by using remote sensing techniques, rice fields with an area over 0.1 hectare could be detected from the space and archive of Landsat 8 is a very useful tool for evaluation of change in agricultural production conditions within the time.

Keywords: *Rice production area, remote sensing, Landsat 8, crop monitoring.*

SOME QUESTİONS OF THE MODELİNG OF SALT TRANSPORT İN SOİLS OF THE PROVİNCİE AKSARAY (TURKEY)

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Abstract

This researchs is focused on some issues regarding salt transport in soils in the Turkish province Aksaray. In this work, analytical solution of a problem on convective-dispersive salts transport in soils of finite and infinite thickness are presented under boundary conditions of the first and third sort on a surface of soil. Using these solutions, we determined the values of the hydrochemical parameters-convective diffusion coefficients and hydrodynamic dispersion-using the results of washing in laboratory and field conditions for soils in the province of Aksaray (Turkey).

Key words: *modeling, salt transfer, soil, hydrochemical parameters.*

SOIL FERTILITY AND POTENTIALLY TOXIC ELEMENT DATABASE PREPARATİON OF TURKEY: EARLY RESULTS OF CENTRAL ANATOLİA SOİLS

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Abstract

A nation wide soil data base project in Turkey has been started at the beginning of 2013 by Research Institutes of General Directorate of Agricultural Research and Policies. The aims of the project are to determinebasic soil properties, fertility status and potential toxic element levels in soils of the agricultural production areas (excluding forest and pastures) in Turkey. For this purpose, about 45.000 soil samples have been collected. Our Institute is responsible for performing soil sampling and analyses of Konya, Karaman, Isparta, Burdur, Niğde, and Aksaray provinces which corresponds to about 12% of the entire project area. After soil sampling and laboratory analyses, soil database will be prepared. This database and soil maps will serve to the user with the help of Geographical Information Systems (GIS) on a web portal. Before the sampling, it was planned to take 5334 soil samples from 0-30 cm depth on the basis of 2.5x2.5 km square grid system by GIS tools from the agricultural areas of Konya, Karaman, Isparta, Burdur, Nigde, and Aksaray provinces. Soil sampling studies, which started in September 2014, were completed in 2016. A total of 5078 soil samplings were collected from the survey area. Analysis of some soil properties (soil texture, soil pH, electrical conductivity, calcium carbonate and organic matter) will be finished at the end of the May 2017 and the results will be presented in this article.

Key words: *Soil fertility, toxic elements, soils, Geographical Information Systems (GIS*).

SUSTAINABLE LANDSCAPE APPROACH WITH XERISCAPE IN ARID REGIONS

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Abstract

The effect of global warming has been well known in recent years. Xeriscape approach having solution qualification comes up with the aim of preventing climate change, providing the usage of water efficiently by minimizing the negative effects of landscape planning and application where water shortage has seen. Water is a natural resource that cannot be produced by human. Its consumption is increasing as well as impact on living conditions without possible alternative. Today natural sources have been decreased as a result of increasing population and urbanization. In order to keep developing and life of plants, it is needed to save rain-water and create alternative water sources that decrease city water usage. Environmental problems have been increasing in recent years and analytical approaches have been developed, creating the designs that will decrease global warming effects also in landscape architecture. These have become main aims. As a result of these approaches, efficient water usage is supplied by choosing drought-resist and natural species with correct design in planting works. It takes a huge step to extinguish the effects of climate changes causing global warming with these arrangements. In this study, proposal landscape design project was carried out with Xeriscape study purposing the efficient usage of water in Nigde district in Omer Halisdemir University having dry climate.

Keywords: *Xeriscape, Arid conditions, Omer Halisdemir University, Water saving.*

DEVELOPMENT OF AN ARCMAP TOOLBAR TO CALCULATE LAND SURFACE TEMPERATURE FROM LANDSAT IMAGERY

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Abstract

Land Surface Temperature (LST) is an essential parameter in environmental studies. Landsat 5, 7 and 8 imageries are quite useful for providing accurate measurements of LST. The main objective of this study was to develop an ArcMap toolbar that can be used to estimate LST from Landsat imageries. Therefore, LST Calculator toolbar was developed using ArcGIS ModelBuilder application in this study. The user can estimate LST from Landsat 5, 7 or 8 images with this toolbar. LST Calculator toolbar employs the Radiative Transfer Equation (RTE) method to retrieve LST from Landsat imageries. For the demonstration purposes, a Landsat 8 scene with path/row 188/29 acquired on August 15, 2016 was downloaded from the USGS webpage to estimate the LST for the city of Sarajevo in Bosnia and Herzegovina.

Keywords: *ArcGIS, ModelBuilder, NDVI, Emissivity, LST Calculator.*

HOW AFFECT CUTTING FREQUENCY ON BOTANICAL AND QUALITY TRAITS OF FORAGE AT A LOWLAND PASTURE?

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Abstract

This study was conducted to determine the effects of different cutting frequencies on forage yield and botanical composition of a lowland natural range in Engiz Village of Ondokuz Mayis County of Samsun Province in Turkey during 2013 and 2014 spring growing periods. The experiment was established according to randomized block design with four replicates. Total hay yield was ranged from 1460.9 to 2741.9 and from 1009.5 to 3410.5 kg ha-^{1} in 2013 and 2014, respectively. The ratios of grasses, legumes and the other species in botanical composition ranged between 31.24-57.19, 20.77-42.79 and 8.75-47.13%, respectively. Crude protein ratios of hay were determined as 11.62-20.27% for grasses, 17.44-26.32% for legumes and 18.06-24.31% for the other species. While ADF ratios ranged between 28.38-38.27% for grasses, 22.54-34.67% for legumes and 23.48-32.33% for the other species, NDF ratios were determined between 46.61-60.27% for grasses, 35.19-46.68% for legumes and 38.49-52.64% for the other species. While phosphorus content of hay was adequate, potassium, calcium and magnesium was high. K/Ca+Mg and Ca/P ratios ranged between 0.82-2.76 and 1.98-8.60, respectively. In the light of the results obtained from this study, the pasture should be grazed concerning appropriate animal density. Otherwise the weeds could increase at the low density grazing conditions. In order to sustain pasture yield, suitable range management program should be prepared and applied.

Keywords: *Cutting frequency, hay yield, botanical composition, mineral contents.*

GREEN AREA PERFORMANCE OF SOME COOL SEASON TURF GRASSES PLANTED WITH DIFFERENT SEEDING RATIOS

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Abstract

This study was conducted to determine different mixture ratios of some cool season grasses with factorial design at randomized blocks with 6 replicates in ecological conditions of Samsun, Northern Turkey in 2016. In this research, *Lolium perenne (Lp), Poa pratensis (Pp), Festuca arundinacea (Fa), Festuca rubra rubra (Frr), Festuca ovina (Fo), Agrostis tenuis (At)* species and different mixture ratios of these species were used as material. The nursery trial was planned as 4 different mixtures, i) 45%Lp+40%Frr+15%Pp, ii) 30%Lp+35% Frr+15%Fo+10%Pp+10%At, iii) 45%Fa+40%Frr+15%Pp, iv) 30%Fa+15%Fo+35%Frr+ 10%Pp+ 10%At; 2 solely treatments (Lp and Fa); 4 seeding rates (30,40,50,60 g^{-1} m^2). While time values to emergence were 43-53 days for Lp and its mixtures, these values were changed between 53-64 days for Fa mixtures. All the plots were moved 5 times and green herbage yield was altered from 23.1 to 593.2 g^{-1} m^2 according to the plots. The least weed ratios were observed in the mixture of Fa. Additionally, as seeding ratios increased, weed ratio was decreased.

Key words: *Festuca arundinacea, Lolium perenne, seeding ratio, weed ratio.*

COASTAL BIOCOMFORT THE MAPPING FOR DOGANYURT (TURKEY)

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Abstract

People are with overall nominal temperature, precipitation, humidity and where in certain ranges of environmental conditions such as wind they feel healthy and dynamic. An appropriate range for the people of these values is called the biocomfort. When biocomfort will be in the range of fair value would bother people in the area and want to get away from the area. Hence bio comfort in the areas used for the purpose of tourism is very important. In this study, biocomfort mapping of Doganyurt (district of the Kastamonu Province in the Black Sea region of Turkey) coastline was done and thus aimed at building pad similar studies in the coastal areas of similar structures. To this end, the climatic data of the Doganyurt were located; equivalent temperature according to the physiological index is biocomfort maps were prepared. To determine the structure of the field is biocomfort, climatic data are collected from meteorological stations. The obtained data were evaluated by means of Rayman 1.2 Program and geographic information system (GIS) is used to produce thermal perception map with the help of software. As a result, the most appropriate time and area for outdoor recreation activities have been identified by thermal perception maps.

Keywords: *Coastline, Doganyurt, biocomfort.*

USING AUTOMATION IN THE PRESSURİZED IRRIGATION SYSTEMS IN THE WORLD AND TURKEY

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Abstract

Irrigation water is applied to the root area of a crop by using different irrigation methods. In agriculture, control systems for water supply have made considerable progresess in recent years, and offering a wide range of new options. Electronic and automation have been more popular in agriculture and hence, the cuurent trend is toward switching from a manual system to automatic operations in micro irrigation systems covering drip and sprinkler irrigation systems. The combination of automation with micro irrigation systems ensure the proper level of water for growing up the plants all through the season, energy savings, reduced labor costs and control in fertilizer, those of which are a few major advantages in adopting automated techniques in micro irrigation systems. With the development of technology, automatic irrigation and also using renewable energy resources such as solar and wind energy have been more popular in agriculture. In Turkey, the energy has been mostly supplied from the coal and fossil fuels which often serves greenhouse gases. It is very important to use the renewable energy sources in agriculture, since the conventional energy sources are expensive. Using wind and solar energy in agriculture have also offered a number of distinct advantages in off-grid areas. In this study, recent developments on irrigation automation in micro-irrigation systems both in the World and in Turkey are being presented with some examples.

Keywords : *Automation, drip irrigation, micro irrigation.*

USE OF VERMICOMPOST AS AN ADSORBENT TO REMOVE HEAVY METAL IN SOIL

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Abstract

Heavy metals are generally described as metals which have relatively high densities, atomic weights. Some heavy metals like iron (Fe) or zinc (Zn) are either essential nutrients or relatively harmless, but can be toxic in larger amounts or some forms. Despite that, some metals, such as cadmium, mercury, and lead, are very dangerous for environment and humans. The most common heavy metals causing soil pollution are copper (Cu), chrome (Cr), cadmium (Cd) and lead (Pb). Heavy metal pollution affects all living organisms and threatens mankind seriously. There are many methods for removing heavy metals from environment, including physical, chemical, thermal and biological processes. The advantage of adsorption over other process is connected with non toxic by-products and high removal efficiency. In recent years various bio-adsorbents were used for heavy metal adsorption. Vermicomposting is a special form of composting. Earthworms metabolize and excrete a mixture of soil and organic matter. In this process, some organic species (proteins, nucleic acids, fats, carbohydrates) have been transformed into a more stable product (vermicompost). Vermicompost derived from different sources was investigated as an adsorbent for heavy metals in some other studies. Earthworms can be defined as a means of extracting metals from contaminated organic solid wastes. This study provides information on previous studies on the use of vermicompost as an adsorbent.

Keywords: *Vermicompost, Heavy metal, Adsorbent, Earthworm.*

USING LANDSAT 8 SATELLITE IMAGE SERIES FOR MONITORING GRAIN MAIZE VEGETATION

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Abstract

Using remotely sensed data as a decision support tool became widespread all over the world. Especially, monitoring of crops by using techniques depending on satellite imagery during the growing periods are recent subjects of many researches. According to results of such studies, vegetation conditions of crops reflecting irrigation, fertilization and effect of insecticides and disease conditions can be determined effectively. Satellite images of big scale agricultural land enables accurate monitoring of numerous properties of crops depending temporal and spatial resolution of satellite image. This study was conducted in 10 grain maize fields of three villages (Yeşilören, Çayırözü and Uzunyazı) of Merzifon county located in northern Turkey. Study fields were determined according to local observations. The surface area of these fields varied between 0.9 and 7.7 ha. Maize crops in this region are generally planted in the first and second week of May. Main purpose of the current study was to determine monitoring opportunities of grain maize crops during the growing period through Landsat 8 satellite image series. NDVI maps were obtained using eight Landsat 8 satellite images acquired within the growing season of grain maize in 2015. The average NDVI values of grain maize cropsvaried from 0.15 to 0.28 in the last week of May. These values were ranged from0.28 to 0.63 in the first period of June among farmers field. At the end of June, NDVI values reached highest values of 0.60 and 0.78. There was no any suitable satellite imagery in August due to cloudiness. However, after September, NDVI values tended to decrease due to repining of maize. Consequently, it is possible to monitor the vegetation level of the maize plant with satellite images in agricultural areas.

Keywords: *Maize, Vegetation, NDVI, Remote Sensing, Landsat 8.*

THE EFFECT OF DIFFERENT IRRIGATION LEVELS ON WATER USE, YIELD AND YIELD COMPONENTS OF TWO FIG CULTIVARS

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Abstract

This study was conducted to observe the effects of different irrigation levels on water use, yield and yield components of two main fig cultivars (Sarilop and Bursa Siyahi) widely grown in Turkey. The experiment was set up in the research area of Fig Research Institute located in Aydın in 2016 growing season. Irrigation treatments were based on soil water depletion replenishment from the effective root zone (1.2 m). Full irrigation treatment I_{100} was designated to receive 100% soil water depletion in every 7-day and the other treatments were obtained irrigation water at the rates of 50% (I_{50}) and 0% (I_0) of the amount received by treatment I_{100} on the same day. As a result of this study, different irrigation treatments significantly ($p<0.01$) affected yield and yield components. The highest average yield 145.9 $kgda^{-1}$ was obtained from the full irrigated treatment (I_{100}) and the lowest fromthe non-irrigated treatment as 106.7 kg da^{-1}. It was determined that Bursa Siyahi cultivar performed better yields than Sarilop. The fresh fruits of Sarilop and Bursa Siyahi cultivars were evaluated for the total soluble solids (%), acidity (%) and pH and it was determined that total soluble solids, acidity and pH were significantly affected by different irrigation treatments ($p<0.01$). As total soluble solids and acidity were found to increase by deficit irrigation levels, while pH value was increased by higher irrigation water. The average seasonal water use varied between 160.9 and 333.3 mm according to the cultivars and Sarilop cultivar had higher water use than Bursa Siyahi cultivar.

Keywords: *Irrigation levels, Deficit irrigation, Fig, Yield and Yield components, Water use.*

CURRENT STATUS OF INVASIVE SPECIES IN THE STEPPE ZONE OF UKRAINE

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Abstract

According to Food and Agriculture Organization (FAO) estimations there is an annual increase in number of animal species going into the abnormal, newer to them environment due to direct or indirect human activity. Share of these animals after adaptation began to compete with native species, invading into stable environmental features of different ecosystems. The result of such penetration can often have irreversible environmental consequences leading to significant biological impairment in living activities of entire ecosystems, resulting in significant economic wastes in the various economic sectors. Currently, according to European and Mediterranean Plant Protection Organization (EPPO) abstinently widespread pests on the territory of European and Mediterranean consist of 162 species. They all have different statuses of danger, both environmental and economic, because their vital functions cause direct economic losses every year. Nowadays, according to the specialists' research, set of potentially invasive species that are able to penetrate into the territory of Ukraine is estimated as 1500 species. Abnormalities in the natural ecosystem functioning caused by the influence of invasive species can also bring direct and indirect risk to human health. According to preliminary estimates, the greatest danger in the steppe zone of Ukraine are 25 species of invasive plants, 110 species of invasive species of invertebrates and 14 species of invasive vertebrates. At the beginning of 21st century, the challenge of risk assessment on the invasive species penetration and control of existing species underlie the national security of every contemporary state.

Keywords: *Invasive species, current status and ecological functions, steppe zone of Ukraine.*

ORGANIC AND INORGANIC AMENDMENTS EFFECT ON THE MACRONUTRIENTS STATUS OF CROP RESIDUE LONG-TERM EXPERIMENT

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Abstract

Continuation of a given agricultural practice over time plays an important role to determine if the nutrient supplying capacity of soil is going to be maintained or declined in a long term. Hence, we analyzed the soil and plant samples from crop residue experiment (CR-LTE) of the Pendleton long-term experimentto determine the dynamics of nitrogen (N), carbon (C), phosphorus (P), potassium (K), calcium (Ca), sulfur (S) and magnesium (Mg) in the soil and in the crop (wheat grain and straw). The CR-LTE consists of a winter wheat- 14 months fallow dryland cropping system with nine treatments of wheat residue incorporation by: fall burn, no N addition (FB0); spring burn with 0 kg N ha^{-1} (SB0), 45 kg ha^{-1} (SB45), and 90 kg ha^{-1} (SB90); no burn with the addition of N at the rate of 0 kg ha^{-1} (NB0), 45 kg ha^{-1} (NB45) and 90 kg ha^{-1} (NB90); no burn with farmyard manure (FYM); and no burn with pea vine (PV) incorporation. The soil samples taken in 1995, 2005, and 2015 from 0-10 cm, 10-20 cm, 20-30 cm, and 30-60 cm depths and the wheat (grain and straw) samples from the same years were used in the analysis. This research observed available P content markedly lower in 0-10 cm depth than in the deeper soil profiles in each studied year. Plant available K, and available Mg declined in the top soil layers since 1995. However, in the wheat grain, total S accumulation increased over the period of 1995-2015. Similarly, FYM, NB45, and NB90 increased the concentration of total N in wheat grain since 1995. Since the FYM treatment had highest concentration of macronutrients (mostly) over the time, including available K and Mg, future planning strategies for long term agriculture practices in this and similar regions should consider manure application.

Keywords: *Long-term, residue, macronutrients, wheat, PNW.*

THE ECONOMIC IMPACT OF CLIMATE CHANGE ON AGRICULTURAL WATER DEMAND IN FRANCE

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Abstract

Present resource pressures and climate change should strongly impact water's availability and, correlatively, the economic situation of farming systems in terms of irrigation demand. The prospective approach that we develop focuses on the link between climate, crop yield and water, in order to assist public decision-making. The objective is to estimate future water demand in France, in a context of farm gross margin maximization. The method is based on the coupling of the AROPAj agricultural supply model with the STICS crop model. Simulations were performed for three climate projections (SRES-AR4 A1B, A2 and B1) from 2010 to 2100. Due to high inter-annual variability of precipitation and existence of substitutions between agricultural productions, irrigation results don't vary regularly from one "climatic" year to the next. Nevertheless, the results suggest a significant increase in water demand for the three projections in case of prices unchanged. The regional study revealed wide disparities. The most irrigated regions such as Aquitaine, Poitou-Charentes or Pays de la Loire would be characterized by the largest increase in demand for irrigation from the 2011-2020 decade to the 2091-2100 decade. We account of pressure on the resource by simulating changing water price scenarios. As expected, rising costs would contribute to a decline in demand, highly differentiated by region. The most affected regions would correspond to the most irrigated ones in absolute and relative terms.

Keywords: *water demand, water prices, climate change, bio-economic supply model.*

RECOLONIZATION OF CULTURAL LANDSCAPES BY LARGE PREDATORS: CHALLENGES AND RECOMMENDATIONS USING GREY WOLF (*CANIS LUPUS*) AS AN EXAMPLE

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Abstract

The present paper deals with the question as to how the re-colonization of Central Europe by large predators, i.e. Brown bear (*Ursus arctos*), Lynx (*Lynx lynx*) and especially Grey wolf (*Canis lupus*) has to be supported by active management efforts. It defines some important future needs of active management based on an analysis of the last decade of re-migration in Germany. Whereas Brown bear and Lynx are spontaneously re-migrating only sporadically, and for Lynx we find some more or less successful re-introduction projects, the actual situation of Grey wolf in Central Europe is characterized by a high rate of re-colonization, establishing local packs and reproducing successfully. In Germany, an exponential population increase (clearly at the actually still low level) is to be observed actually. As a consequence, conflicts between different stakeholders with respect to the wolf management are also increasing. Over the last 15 years the core business area of large predator management was to avoid or to reduce those conflicts. However, conflicts between different stakeholders are increasing, and management has failed to a large extent. It is shown that existing management plans e.g. by several German states are not sufficient to guarantee an adequate management of the species, minimizing the existing conflicts between different stakeholders. The existing management plans and protective legislation are to be exempted from bureaucratic restrictions and improved on a scientific basis. It is further shown that participatory processes involving all relevant stakeholders are required in development of management plan as well as in conservation legislation. In addition, there is a lack of fundamental knowledge concerning the development of wolf-man interactions in densely settled and urban environments. So, the actual situation requires also intensive research on questions as predator-prey-relationships, dynamics of re-colonization by the wolf, disease management, hybridization, development of repellent techniques and, last but not the least, research on the question as to how we can maintain timidity against man.

Key words: *large predators, Canis lupus, re-colonization, conflicts, management.*

ECOSYSTEM SERVICE ASSESSMENT IN AGRICULTURAL WATERSHED BY USING TOPMODEL

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Abstract

In Millennium Ecosystem Assessment established by the United Nations, the ecosystem services (ES) provide benefits for human life as well as the environment. There is "regulating services" among all the supporting services. As a regulatory service, forests alleviate the flood risk after heavy rain by storing rainfall temporarily into forestlands and prevent the sudden increase in river discharge. The purpose of this research is to develop a hydrological modelling to assess this service in a watershed where consists of not only forestland but also grassland. TOPMODEL is applied for the quantification. This model was invented to forecast river discharge in watersheds where the land use is uniform. However, the model has not been applied to a watershed where agricultural and forest area are mixed in Japan. This research aimed to develop TOPMODEL to apply to such complexed land use. Because the targeted watershed is consisted of two land-use types, TOPMODEL was applied in each grassland and forestland. It predicted the river discharge by combining the predicted discharge from the different types of land calculated by TOPMODEL. The result confirmed that by developing the model, it was able to assess the water discharge from the both grassland and forestland in a watershed. The developed model also showed the better reproducibility of river-discharge prediction than the conventional TOPMODEL. In addition, it clarified that the forestland stores more water than grassland into the ground. Therefore, the effect of flood control which is the regulatory service of ES was assessable through the developed model.

Keywords: *Hydrological modelling, River discharge, Agricultural watershed, Land use*

CARBON EXCHANGE IN THE AGROECOSYSTEMS OF MAIZE (ZEA MAYS L.) AND RAPESEED (BRASSICA NAPUS L.)

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Abstract

The aim of this research was to calculate and compare the C budget metabolic changes for maize *(Zea mays* L.) and rapeseed *(Brassica napus* L.), identifying soil seasonal respiratory CO_2 emissions (R_{a+h}) and assimilated photosynthetic CO_2 emissions during different growth stages. The research was carried out for maize *(Zea mays* L.) and rapeseed *(Brassica napus* L.), during the vegetation period (2014 June - September) at the Training Farm of the Aleksandras Stulginskis University, Kaunas district, Lithuania. The mean soil CO_2 emissions were 1.971±0.12 μmol $m^{-2}s^{-1}$ for maize, and 2.199±0.25 μmol $m^{-2}s^{-1}$ for rapeseed depending on meteorological conditions and soil C_{org} concentrations (r = 0.9). Assimilated CO_2 rate of maize recorded the highest in the beginning of July (17.74 μmol $m^{-2}s^{-1}$) at flowering stage (BBCH 40-69), and rapeseed in June (14.44 μmol $m^{-2}s^{-1}$) at stem growth stage (BBCH 30-50), when crops accumulated the highest biomass due to the most intensive LAI grow (r_{LAI} = 0.9). The mean assimilated CO_2 gains of maize were 24% higher than that of rapeseed due to crops' different biological peculiarities. Net primary productivity (The mean C budget in maize agro-ecosystems was 15.54 t ha^{-1}, while it was 10.30 t ha^{-1} in rapeseed. NPP) of maize was estimated by 31% and 91% higher than that of rapeseed in July and August, respectively. Therefore, mean NPP was 15.54 t ha^{-1} in maize and 10.30 t ha^{-1} in rapeseed agroecosystem. The mean NPP of maize was assessed by 66% higher than that of rapeseed during growth period. That indicated higher carbon sequestration potential of maize than that of rapeseed. Consequently, sequestered C gain depends on the crop species and environmental conditions. Moreover, carbon sequestration might be improved due to altering the current flux rates through crop rotation management.

Keywords: *Brassica napus, CO_2, net primary production, gross primary production, Zea mays.*

SHEAR STRENGTH OF THE SELECTED COAL MINING WASTES

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Abstract

The tests aimed at the determination of the influence of granulation, compaction and the shear rate on the shear strength parameters, which is the angle of internal friction and cohesion of the unburnt coal mining waste from the mine "Anna" from Upper Silesia (Poland) with grain sizes less than 10 and 40 mm. The tests were conducted in a standard (sample size 12×12×7.5 cm) and a medium size (sample size 30×30×13.6 cm) direct shear apparatus respectively for finer and coarser material. The shear rate was 0.1 and 1.0 mm·min^{-1}, and the maximum value of the shear stress in the range of relative deformations up to 10% was assumed to be the shear criterion. The test samples were formed at the optimum moisture content to achieve a degree of compaction I_S = 0.90 and 1.00. According to the geotechnical nomenclature, the examined waste was classified as multi-fractional medium sand gravels (d < 40 mm) or fine sand gravels (d < 10 mm). The carried out research revealed a significant effect of granulation on the values of the shear strength of the coal mining waste – as the grain thickness increased, the angle of internal friction decreased and cohesion increased. There was a similar effect of compaction and shear rate on the shear strength parameters for both grain sizes of the examined waste. The increase in compaction caused an increase in the angle of internal friction and cohesion, and the increase in shear rate resulted in a slight increase in the angle of internal friction and a noticeable reduction in cohesion.

Key words: *Coal mining wastes, Earth structures, Angle of internal friction, Cohesion.*

SPECIES RESTITUTION – A WAY TO IMPROVE FLORISTIC DIVERSITY OF MEADOW COMMUNITIES IN „SKARPA URSYNOWSKA" NATURE RESERVE (POLAND)

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Abstract

The landscape reserve „Skarpa Ursynowska" is one of the 12 nature reserves situated in Warsaw (Poland). It was created in 1996 to protect piece of the high Vistula escarpment along with meadows and peat bogs of high natural values, which are located at the foot of Vistula escarpment. Cessation of management (from 1998 year) and the neglected, non-functioning drainage system for many years, as well as the storm canal banks covered with the concrete, have contributed to changes in habitat conditions and in botanical composition of post-marsh meadow communities. Floristic impoverishment of meadow communities, development of herbaceous (mainly willow) communities and invasive, arable land weeds and ruderal plants were demonstrated. These communities were characterized by small natural values, which reduced the aesthetic and landscape value of the reserve. The inadequate protection status of the meadow communities of the "Skarpa Ursynowska" reserve obliges to take action to stop the above mentioned processes and to restore the multi-species meadow communities. For this purpose, seedlings of wild flowers, dicotyledonous plant species (grown in laboratory conditions from seeds obtained from natural sites) were planted. The studies were carried out during 2015–2016. The growth and development of plants, the condition and range of the populations and the threats of 22 plant species were determined. It was found that most populations of species from drier habitats survived and unsuccessful were especially species with higher water requirements. On that basis, further protective measures were established.

Keywords: *Restitution of meadow species, wild flowers, post-marsh meadow, „Skarpa Ursynowska" nature reserve, Poland.*

SOIL DEGRADATION BY EROSION IN VALEA BECIULUI RIVER BASIN OF ROMANIA

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Abstract

The Beciului Valley River Basin covers an area of 184.3 ha, of which 38.3 ha are located on land with a slope of over 35%. The present state of soil degradation in the catchment area is a consequence of anthropogenic intervention through unreasonable exploitation of resources. Years ago, part of the 10-15% slope category was used as arable land. The intensification of erosion degradation processes has led to the change of agricultural use in pasture with pastoral exhumation and with socio-economic consequences for the rural population in the area. Soil evolution has been influenced by erosion degradation processes specific to slope slope, with morphometry, shape, exposure and slope slopes being of particular importance. In order to know the soil cover in the studied area, a complex pedological study was carried out, which identified the soil types and their degree of degradation. A conclusive picture of the soil cover degassing is given by the quantitative estimation of eroded soil lost. For this, we used the estimation model elaborated by the nowadays academician Prof. Moţoc M. Improving the degradation state can be done by restoring the vegetal carpet and organizing the territory, which is the basic work. This paper aims to link the pedogenic processes through which the soils are formed and the intensity of the water erosion that slows them.

Key words: *hydrographic basin, erosion, soil classes.*

EFFECT OF INVASIVE SPECIES IMPATIENS PARVIFLORA ON SOIL MICROBIAL INDICES IN THE PROTECTED AREAS IN SLOVAKIA

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Abstract

Biological invasions are one of the main threats to natural ecosystems and the impact of invasive plant species on native species, communities, ecosystems and soil biota has been widely recognized over the last decades. Costs of invasive species are estimated to range from millions to billions of euros annually and the success of invasive species has been attributed to their biological and ecological trails. Our study aimed to assess the effect of invasive plant species *Impatiens parviflora* on selected soil microbial indices and physicochemical characteristics. The research was carried out during a vegetation season on 3 protected areas of Norths-Eastern Slovakia in 2015. Soil reaction, soil organic carbon, bulk density, soil porosity and soil moisture were selected to determine soil physicochemical properties. As the microbial indices, that mainly indicate soil microbial activity, we selected soil microbial respiration and soil enzymatic activity (urease, acid and alkaline phosphatases). The results showed that *I. parviflora* prefers acidic and non-compacted soil conditions. The results also suggested that biology of the invasive plants had the high impact on soil ecosystem and soil enzyme activity played an important role in nutrient cycling in the ecosystems, and thus could be considered as biological indicator of soil health and environmental changes.

Keywords: *Impatiens parviflora, Enzymatic activity, Protected areas, Soil characteristics.*

MODELLING OF TEMPERATURE DISTRIBUTION IN EXTERIOR WALL USING FINITE ELEMENT METHOD

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Abstract

The temperature profile of exterior frame wall is the one of the important parameters in determining where condensation may occur within an exterior wall and thus where the necessary precautions should be taken to eliminate adverse moisture conditions. This study aims to determine the temperature gradients throughout the walls using finite element method. To this end, a poultry house was selected and the indoor and outdoor temperature and humidity values were determined using data loggers. In addition to the existing walls in the poultry house, different wall combinations were created. By determining the temperature distributions in all created wall combinations, the most suitable wall type for the poultry house was determined. In conclusion, the finite element analysis can be used for prediction of temperature gradient in walls and provides a good design practice in building engineering.

Keywords: *Finite element method, Poultry house, Temperature, Moisture, Condensation.*

INVESTIGATING THE SUITABILITY OF DRAINAGE CHANNELS FOR IRRIGATION IN BAFRA PLAIN

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Abstract

In this study, drainage effluent water quality parameters of Muamlı and Bedeş drainage canals, to which there aren't any intrusion from other places, were monitored year-long and the effects of drainage canals on salt leaching from plain soils were assessed. Water samples were taken from 9 different locations of Muamlı and Bedeş canals in July and September. Soil samples were taken from paddy fields irrigated with the effluents of these drainage canals after the harvest. Water and soil samples were analyzed for different quality parameters. Present findings revealed that water samples did not have any problems with regard to residual sodium carbonate (RSC), sodium, sulphate and chlorine and can be used safely. For Salinity of water samples taken from Muamlı drainage canal (EC_w) varied between 2.79 – 2.97 dS/m (with an average value of 2.86 dS/m) and EC_w values of Bedeş drainage canal varied between 1.01 – 4.95 dS/m (with an average value of 3.96 dS/m). It was concluded that drainage canal effluents created serious salinity problems and ultimately resulted in significant yield losses.

Key Words: *Bafra Plain, Drainage, Salinity, Paddy*.

THE EFFECT OF SALİTİNESS ON SEED GERMİNATİON PERFORMANCE OF TEDERA

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Abstract

This study was carried out to determine the effect of different salt concentrations on seed germination performance of 85 different Tedera genotypes with 4 replicates at seed Laboratory of Agronomy Department in Ondokuz Mayis University, Samsun, Turkey. In study, five different salt concentrations (0 (Control), 25, 50, 75, 100 mM) were used. For germinations tests the seeds put inside petri dishes and process were performed at a fully controlled climatic chamber with a constant temperature (24°C) and 60% aerial relative humidity. In control test, the seeds achieved full germination level in 11 days but as salt concentration increase, germination period was also increased up to 30 days for 100 mM concentration. Increasing salt concentration affected on negatively germination ratio, seedling and root weights and seedling length. For example, while germination ratio was about 48.77% for control, it was decreased to 11.37% for 100 mM dose. Decreasing rate was 76.69%. The least decrease was observed for fresh seedling rate against to increasing NaCI doses. Decreasing rate were 42.86%, 82.49% and 81.70% for fresh seeding weight, root length and shoot length, respectively at 100 mM dose.

Key words: *Tedera, Salt Tolerance, Germination, Seed.*

DETERMINATION OF RELATIONSHIPS AMONGST THE ALTITUDE, GROWING CHARACTERISTICS AND YIELD FOR TEDERA

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Abstract

This study was carried out with 86 *Bituminaria bituminosa* genotypes collected from Central Black Sea Region of Northern Anatolia in Samsun (Turkey) in 2012. After seed cleaning, germination tests and scarifying the seeds with sandpaper, seeds were sown in small pots. In November of 2012, the seedlings were transplanted to experimental field. Neither fertilizer nor water applied throughout the study and spring (6 times with 10 days interval in April and May) and autumn elongation. Hay yield and harvesting number in the second year of the plants (2014) were observed during the study. According to correlation analysis, increasing altitude that the genotypes were collected from affected other traits, negatively. In other words, as the altitude increased, the genotypes started elongation later in spring and autumn, and hay and seed yields and harvested number were decreased. There were positive linear correlation between hay yield and autumn and spring elongations. Though autumn and spring elongations affected the seed yield of genotypes positively, relationships only between seed yield and mid of May elongation and hay yield were significant ($p \leq 0.05$).

Key words: *Tedera, yield, relationship, elongation.*

IMPACTS OF ROW SPACING AND SOWING DATE ON FORAGE COWPEA (VIGNA UNGUICULATA L. WALP.) HAY YIELD AND QUALITY

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Abstract

Cowpea is often used as human and animal nutrition and green manure. This study was conducted in order to determine the effects of different row spacing and sowing-time on hay yields and some properties of forage cowpea cultivar "Ülkem" and a genotype in ecological condition of Amasya-Suluova. Different row spacing (30, 45, 60, 75 cm) and sowing time (1 May and 1 June) were used according to split block design. In this study, plant height, main stem width, branch number, pod weight, leaf ratio and hay yield were determined. In this study, it was clear that the cultivar Ülkem was superior to the promising genotype; higher yields were obtained in sowing date 1st May; larger row spacing caused decreasing of hay yield. The highest forage yields were determined at 30 cm row spacing (15.87 and 9.78 t/ha) for both sowing date. Crude protein ratios of hay varied from 18.61% to 20.00%. NDF ratios of hay were 33.21% and 32.73% for 1st May and 1st June sown, respectively. Average ADF ratios were 30.09% and % 30.81 for the same sowing dates. P, K, Ca and Mg contents were 0.35% and 0.37%, 1.97% and 2.01%, 1.51% and 1.56%, 0.49% and 0.52% for 1st May and 1st June sown, respectively. In conclusion, in order to obtain high and quality forage yield, Ülkem cultivar should planted with 30 cm row space at the beginning of May in Suluova conditions.

Keywords: *forage cowpea, hay quality, row spacing, hay yield, sowing date.*

EVALUATION OF AGRICULTURAL ENVIRONMENT INDICATORS WITHIN THE SCOPE OF AGRICULTURAL SUSTAINABILITY

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Abstract

In this work, the concept of sustainability and the indicators of the agricultural environment are explained. In the study, agri-environmental sustainability was assessed by index method in Sinop province Sarıkum Lake basin. The index consisted of ten indicators: ratio of farm operators applied synthetic fertilizer, ratio of farm operators applied pesticide, ratio of farms faced with soil erosion, ratio of protected area, ratio of farm operators who were satisfied with the existence of the protected area, ratio of farm operators making soil analysis, ratio of farm damaged by wild animals, crop diversity, the size of land with the slope more than 20% total land, and number of land parcels. As a result, the level of agri-environment sustainability was found on the unsatisfactory level in Sinop Province, Sarıkum Lake Basin. However, the use of unconscious input in the research area was common, damage to wild animals in the land was high, and amount of protected area was low. Despite the damage of wild animal, satisfaction levels of the farmers' were very high in this area. This result requires a separate sociological investigation. In this basin, supports based on the environment should be extended (support of ÇATAK, organic agriculture, and good agricultural practices), the amount of protected area should be increased to the micro catchment level, population control methods should be developed by conducting a research for wild boar population.

Key words: *Sustainability, agriculture, indicator, index, Sinop.*

SIMULATION OF SUSPENDED SEDIMENT LOAD USING ARTIFICIAL NEURAL NETWORK MODEL, CASE STUDY: HARAZ RIVER, IRAN

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Abstract

Artificial neural network (ANN), multiple linear regression (MLR) and sediment rating curve (SRC) were compared to model the daily suspended sediment load in Karehsang gauging station in Haraz River, Haraz-Gharesoo watershed, Iran. The suspended sediment load was related to the average rainfall and streamflow. In this study, eight input combinations, which fell in two groups, were used. Models in Group I used both climatic (Rainfall) and hydrologic variables (streamflow) as inputs. Models in Group II tried to predict sediment from streamflow only. Root mean square error (RMSE) and correlation coefficient (R) statistics were employed to evaluate the performance of the ANN, MLR and SRC models for forecasting suspended sediment load. It is demonstrated that ANN is capable of modeling the daily suspended sediment load with fairly good accuracy when proper variables and their lag effect on the suspended sediment load are used as inputs. Compared with multiple linear regression and sediment rating curve models, ANN can generate a better fit under the same data requirement. In addition, ANN with previous three days rainfall and streamflow information can provide more reasonable predictions because of the distributed information processing system and the nonlinear transformation involved and also importance of lag-effect in input variables.

Keywords: *Artificial neural network, multi linear regression, sediment rating curves, daily suspended sediment load, Haraz river.*

COMPARISON OF MEASURED AND SIMULATED EC OF SOIL WATER IN RELATION WITH IRRIGATION WATER SALINITY AND LEACHING RATIO

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Abstract

The soil salinity which affects the plants is the soil water salinity i.e. the EC of soil water absorbed by soil particles which remains within the soil components against the gravity forces, not the EC of soil water extract which is the excess water added to the soil to fill the gaps in the soil volume. In this study the soil water was extracted from the soil after the irrigation practices by using suction probes which were situated at 20, 40, 60 and 80 cm depth of soil columns and the salinities were measured by EC meter (YSI3200), and analyzed Cl- by using ion chromatography (Dionex 1600) system. On the other hand, the EC of soil water was simulated by using HYDRUS-1D mathematical model for the same depths of soil and for the same irrigation times. Experiments were conducted in 40 cm diameter and 115 cm depth soil columns using with 5 irrigation water salinities (0.25-control, 1.5 and 3.0 dS m^{-1} with $NaCl+CaC_2$ and with $NaCl+CaSO_4$ salts), and two leaching fractions (15% and 35%) with initially saline silty-clay ($EC_{e1/2}$=1.9 dS m^{-1}) soil. The results were evaluated using MAE, RMSE, RE, and R^2. Results showed that the HYDRUS-1D simulations were significantly close to the measured salinity and Cl^- values and thus HYDRUS-1D simulations can be used successfully for determining the soil salinity and Cl^- changes due to the irrigation water salinity and leaching fractions in sandy-loam soils.

Keywords: *Hydrus-1D, irrigation water salinity, movement of salts, lyzimeters.*

THE EFFECTS OF IRRIGATION WATER SALINITY AND LEACHING FRACTIONS ON SAR COMPONENTS OF SOIL SOLUTION IN LYZIMETER CONDITIONS

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Abstract

SAR value is one of the most significant parameters in evaluating soil sodicity. In this study, we analyzed the content of SAR components Na^{+}, Ca^{+2} and Mg^{+2} in the soil solutions obtained by using suction probes, during irrigation practices, situated in 20, 40, 60 and 80 cm of soil depths, in relation with irrigation water salinity and leaching fractions in soil columns. Experiments were conducted in 40 cm diameter and 115 cm depth soil columns using with 5 irrigation water salinities (0.25-control, 1.5 and 3.0 dS m^{-1} with $NaCl+CaC_2$ and with $NaCl+CaSO_4$ salts), and two leaching fractions (15% and 35%) with initially saline sandy-loam ($ECsp_{1/2}$=1.92 dS m^{-1}) soil. The Na^{+}, Ca^{+2}, and Mg^{+2} concentrations of soil solutions were compared with the same ion concentrations simulated by using HYDRUS-1D mathematical model with the correlation coefficients. The correlation coefficients (R^2) were between 0.870-0.994 for Na^{+}, 0.917-0.984 for Ca^{+2}, and 0.337-0.965 for Mg^{+2} at 15% of leaching fraction level and were between 0.246-0.986 for Na^{+}, 0.915-0.980 for Ca^{+2}, and 0.835-0.956 for Mg^{+2} at 35% of leaching fraction level, respectively. The major part of the correlation coefficients were high enough to evaluate a good relation between the measured and simulated concentrations of these ions.

Keywords: *Salinity, Hydrus-1D, leach fraction, soil solutions.*

CRISIS MANS ATTITUDE TOWARDS THE ENVIRONMENT

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Abstract

A significant part of the history of civilization is characterized as exploitation, destruction and neglect of the environment. The concept of evaluation of natural values is more recent. With the beginning of the third millennium man lives in different moral valuescriteria. If all life situations boiled down to the version: where not deny knowledge of objective reality, and where it would deny it then possible to speak about the ethics of man's relationship to the environment. The more the world becomes artificial, made as a world system, the greater the possibilities of abstraction, the greater the synergism that must be kept in mind and more is only partially predictable side effects which can mutually interact. This paper will discuss philosophy crisis of human relationship to the environment, the conditions of peace with nature in terms of non-violent understanding of nature. Then we will analyze the role of science for achieving balance revitalization action of man, where he consciously accepts responsibility for natural systems and species in addition to responsibility for future generations.

Keywords: *Attitudes towards the environment, revitalization, environmental ethics, the role of science, peace with nature.*

IMPACT OF AGRICULTURAL PRACTICES AND URBANIZATOIN ON GROUND INVERTEBRATE FAUNA IN THE SUEZ CANAL REGION, EGYPT

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Abstract

Ground invertebrate fauna is the most diverse and important group to maintain the soil health. The Suez Canal is the Egyptian water corridor connecting the Red Sea in the south and Mediterranean in the north.The Suez Canal region has a unique status in Egypt. Since the opening of the Suez Canal for international navigation in 1869, population in the Canal region increased and green areas expanded. The expanded cities have initiated new habitats and attracted some taxa from the Nile valley to the west bank of the Suez Canal. The distribution pattern of ground-macro invertebrates has been investigated in correlation with the selected land-use formsalong the west bank of the Suez Canal in a considerable region. The faunal samples were collected using pitfall traps in nine sites belonging to three stationsin the study area:Abusultan, Fanara and Geneifa, with different land use practices (natural desert, agricultural areas and urbanized coast). A total number of 3502 individuals of insects, malacostracans, gastropods and arachnids belonging to 129 species were found. The highest species richness was shown by Coleopterans, while the most abundant group was Hymenoptera. The agricultural and the urbanized coastal sites have shown significantly lower abundance of ground macro-invertebrates in comparison with the natural desert habitats. It was concluded that urbanization and agricultural practices have altered soil properties, thus they adversely affected the abundance of ground invertebrate assemblage.

Key words: *Ground invertebrate fauna, Suez Canal region, Distribution pattern, Urbanization, Agricultural practices.*

EVALUATION OF RISK INDICATORS FOR DIFFUSE PHOSPHORUS LOSSES IN NORTHEAST GERMANY

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Abstract

For the assessment and mitigation of diffuse phosphorus (P) losses from agricultural fields and their flow into surface waters, knowledge of P contents in soils and P application rates are not sufficient, because diffuse P losses also depend on transport factors, such as erosion, runoff and subsurface drainage. The "phosphorus index" (PI) is a risk assessment tool for diffuse P losses from agricultural fields which is based on a simple algebraic combination of source (soil test P, fertilizer, and manure additions) and transport factors (e.g., erosion, runoff, subsurface drainage, riparian buffer strips). The objective of this study was to develop and evaluate PI for NE Germany. This PI was based on Pennsylvania and Danish P indices but some other factors were also taken into account, such as wind erosion, soil leaching potential, and groundwater influence. The sensitivity analysis showed that soil test on P, manure application and the riparian buffer factor had the largest impact on PI values. An application in two mesoscale catchments revealed different area-averaged PI values, which largely correspond to measured P losses by riverine flow at the catchment outflow. The results show that the proposed P index is a good indicator for P loss at the catchment scale. More detailed studies to evaluate the P index at the field scale are currently underway.

Keywords: *agricultural nutrient management, non-point source pollution, phosphorus export, phosphorus index, surface water, water quality.*

MOLECULAR ASSESSMENT OF GENETIC DIVERSITY IN WILD POPULATIONS OF *PINANGA DICKSONII* USING SSR MARKERS

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Abstract

A precise understanding of genetic diversity and relatedness of *Pinanga dicksonii* (Roxb.) is an important component in its genetic improvement and germplasm conservation. *P. dicksonii* is found growing wild. It is the most endangered palm species followed by *Bentinckia nicobarica* and *Arenga pinnata*. A molecular evaluation of genetic diversity and relationship between different populations of *P. dicksonii* was carried out using simple sequence repeat (SSR) markers. Among the 10 SSR markers, 9 successfully amplified the polymorphic SSRs for 9 populations of *P. dicksonii*, demonstrating a total of 123 alleles at 19 loci with a range of 2 to 9 alleles at each locus, with an average of 6.47 alleles per locus. Allele frequency at each locus ranged from 22.22% to 100% with a mean of 71.92%. The polymorphic information content (PIC) of each primer varied from 0.25 to 0.87, with an average of 0.38. The UPGMA-based clustering analysis performed by NTSYSpc (version 2.0) program revealed that among the 9 populations, there was a high level of polymorphism as well as genetic similarity with index values ranging from 0.473 to 0.928. The present study provides evidence on the genetic variation observed in the collected samples from wild conditions. Proof of understanding on genetic diversity and relatedness has been established among different accessions of *P. Dicksonii* through the SSR-based analysis. Thus, more studies of this nature need to be conducted to assess the phylogeny of this species at molecular level which aid in its germplasm conservation.

Key words: *Genetic diversity, Pinanga dicksonii, SSR markers, UPGMA cluster analysis.*

MAPPING SOIL SALINITY USING REMOTE SENSING TECHNIQUES IN SALINE RANGELANDS OF CHEZAN PLAIN (CENTRAL IRAN)

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Abstract

Soil salinity phenomena are one of the main problems in arid and semi-arid lands. Saline soils are extended through huge part of Iran, and also it threats its neighbor lands to get salinity as serious dangerous. Therefore, in order to?? soil usage and operation, qualitative monitoring is necessary. One way of studing soil salinity is using remote sensing. The present study was carried out between 2014 and 2015, with purpose of using remote sensing in mapping soil salinity in in saline rangelands of Chezan plain (Markazi province, Iran). For mapping of soil salinity with remote sensing, first sensor image LISS III (2008), IRS satellite were used and then, after applying geometric and radiometric correction for extraction of salinity maps, classified algorithm and maximum likelihood method were used. Another way regarding remote sensing technique was use of spectrum indexes for extraction maps of soil salinity. Four factors with names BI, SI1, SI2, and NDSI were used. Among these factors, SI2 with more correlation (0.63 in 1% level) was the suitable factor for map of zoning soil salinity. Regarding the salinity map, the result of this salinity showed that the most area of lands was related to class 2 with salinity between 4-8 ds/m.

Key words: *Soil salinity, LISS III, Spectrum Index, Chezan, Remote Sensing.*

EFFECT OF HARDWOOD GROUP CUTTING ON ACCUMULATION, DENSITY AND TEMPERATURE OF SNOW (CASE STUDY: KHEYRUD FOREST RESEARCH STATION) IN IRAN

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Abstract

Tree cutting can affect different aspects of forests. To investigate the changes on snow accumulation, density and temperature due to tree cutting in the forest, two forestry regions were selected, one control and the other the cutting region. For measuring snow accumulation, 10 pickets in cut area and 10 pickets in control area were installed, and snow height was measured every 5 days. For determining the density, a snow profile was dug and sampling was done with 500 cm3 sampler from different depths every 5 days. Finally, snow temperature was measured at different depths with thermometer. The results indicate that the average of snow density in cutting region and control region are 0.178gr/cm^3 and 0.151gr/cm^3, respectively, and there is not any significant difference between them. Also decreasing in canopy due to tree cutting has a significant relation with snow accumulation and its depth, which increases and they all together result in more snow accumulation. So, average snow height in control region was 13.88cm and after cutting increased to 21.15cm. Snow temperature increasing is significantly related to the decreases in canopy. Therefore, the average snow temperature in control region is -3.3°C which decreases to -10.3°C by cutting the trees.

Key words: *Hardwood, Snow accumulation, Group cutting, Snow temperate, Snow density, Kheyrud forest.*

FARMERS' ATTITUDES AND BEHAVIORAL INTENTIONS TOWARDS BIODIVERSITY CONSERVATION: THE CASE OF FARS PROVINCE, IRAN

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Abstract

Biodiversity is globally recognized as a foundation stone of healthy ecosystems, and biodiversity conservation is increasingly becoming one of the important aims of environmental management. In spite of this fact, human-driven land-use changes, especially during the last century, have already caused decline in biodiversity. In this regard, the intensification and expansion of modern agricultural practices in many countries has led to the biological simplification of the farmed environment and has declined farmland biodiversity during the last century. Since attitudes and intentions towards viability of specific conservation practices strongly impact human decisions on adoption of these practices and change, this study aimed to investigate farmers' attitude and intension towards biodiversity conservation. A survey was conducted by questionnaire in Fars province, south of Iran, and data was collected from 274 farmers, who were selected using stratified random sampling. The results of the study showed that age, education level and knowledge have significant effects on attitude towards biodiversity conservation. Also, attitude towards biodiversity conservation, skill to use strategies for biodiversity conservation and perception of the impacts of agricultural practice on biodiversity had significant and direct effects on the farmers' intention towards biodiversity conservation. The findings of this study could be used by planners and policy-makers to improve farm biodiversity in different parts of the world.

Keywords: *Agriculture, Attitude, Biodiversity, Farmers' intention, Iran.*

SCIENCE AND TECHNOLOGY INNOVATION FOR SUSTAINABLE DEVELOPMENT

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Abstract

Nowadays, technically and politically, there is a growing international consensus about science and technology (S&T) being a key for achieving global sustainable development. It is well recognized worldwide that international science and technology cooperation initiatives could play an important role in steering developing economies towards sustainable development. However, most of the information we have clearly indicate that very few countries, if any, have the capacity knowledge platforms and resources to do this alone. Initiatives are needed to integrate certain elements, including science and technology and knowledge transfer, in the long run, and to build effective knowledge networks involving the local community and variety of stakeholders, including business stakeholders. To put such initiatives in action, however, requires more effective partnerships, and cooperation between regions, between countries, between institutions and between people. This cooperation should be both North-South and South-South oriented and between governments, academia, and business in both developed industrialized countries and developing ones. Furthermore, such cooperation should be fundamentally directed towards fostering capacity building in science and technology, facilitating effective diffusion of scientific knowledge and technology transfer and towards developing knowledge infrastructure and networks. Those approaches are indeed the driving force that helps in providing a platform appropriate for most countries to learn and find innovative ways of taking ownership of their sustainable development areas, especially ecological problems related to land degradation, climate change and fresh water shortage. In this way, those country would find options and innovative modalities to tackle the challenges of producing more with less water.

Key words: *Agriculture, knowledge transfer, ICT, cooperation, sustainable development.*

COMPARISON OF WATERMARK SOIL MOISTURE CONTENT WITH SELYANINOV HYDROTHERMAL COEFFICIENT

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Abstract

Agricultural producers determine irrigation scheduling practices for crops water requirement better when the soil water content of their fields is known. Selyaninov Hydrothermal Coefficient (HTC) is used for identifying drought during the active vegetation period in Lithuania, based on the water balance equation. Farmers make measurements of soil moisture simply with humidity sensors, for example Watermark type. The Watermark soil moisture block is sold as a qualitative indicator of soil moisture for applications such as irrigation scheduling. The Watermark sensors utilized a local soil water retention relationship in order to convert soil water potential into volumetric water content. Soil humidity values established using Watermark type humidity sensors and value interpretations are based on manufacture indications. However, they have not been adapted to Lithuanian conditions. Errors in soil moisture measurements (or other methods of soil moisture determination) require that irrigation commences at a higher threshold of the measured soil moisture content, so that with a given statistical probability (coincidence level), the true value of soil moisture content is not lower than the threshold. Soil moisture was measured with Watermark soil moisture sensors placed at 20 and 50 cm depths. After analyzing the values taken throughout the whole period and summarizing the results it has been identified that plant growth condition period evaluation according to HTC and factual soil humidity reserves differs by 20%. HTC meaning dependencies during vegetation period using Watermark measured humidity, strong or averagely strong interrelation is determinate, in most cases – statistically significant.

Keywords: *Selyaninov Hydrothermal Coefficient, Soil moisture, Watermark.*

CONSEQUENCES OF FUTURE FOREST EXPANSION AT THE ARCTIC TREELINE IN NORTHERNMOST NORWAY

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Abstract

Seedlings of the mountain birch (*Betula pubescens* var. *tortuosa*), were transplanted to an Arctic site in Vardø, partly at a snow-free site, sheltered by a willow thicket, and partly on an exposed ditched peat bog with thick snow cover from a nearby snow fence. Annual measurements were carried out on survival and growth parameters. The preliminary conclusion from this study is that the local climate may be more important than the overall climatic variation in the adaptation and reforestation process in northernmost Fennoscandia. In this process, the subarctic willow and shrub vegetation seems to be an important factor influencing the microclimate and seedling establishment. Species and provenances originating from areas with similar latitudes and climatic conditions as the reforestation area seemed to be most successful. The Varanger area has always been a meeting place between different cultures, i.e. the Sami, Norwegian, Finnish and Russian population. The study indicates that in a changed climate the birch forest area would expand because there will be more willow growth and consequently more safe sites for birch seedling establishment and growth, which would also create a better local climate for the human population. In this process local birch populations that are adapted to a more coastal climate, would have an advantage. Since the birch has been shown to be an important resource for all these cultures, this would decrease the level of conflicts between the different groups of stakeholders about the resources in the area.

Keywords: *Forest expansion, arctici treeline, mountain birch, Norway.*

ROLE OF TREES IN AGRICUTURAL LANDSCAPE

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Abstract

The trees are primarily farmers' allies in the struggle for better yields. The farm produces a large functional whole with a possibly closed loop of matter. Looking at the countryside, it is necessary to evaluate the elements such as the size and distribution of fields and the environment: crows, clumps or bushes and trees, watercourses and reservoirs, sequences of arable land and grassland and high woody vegetation, named meadfield trees. Good farming cannot be done without trees. They are particularly important in the non-forested area, poorly planted with poorly spaced forests, and in areas with light soils, with insufficient rainfall and limited groundwater and soil resources. Trees are an essential element of the landscape, stabilizing the conditions of agricultural production, as follows:

- they protect the fields from harmful winds on average 15-26%, maximum 50-70%,
- they contribute to the storage of water - they reduce the water loss caused by soil evaporation by an average of 25%, affect the soaking of the soil in the summer and in the winter of its freezing,
- they raise the humidity of the air in the ground layer, ie they increase the condensation of water vapor in the plants, on their surface and in the soil, also due to the greater amount of precipitation,
- they limit wind erosion,
- they limit the water erosion, ie the surface runoff of water to the underground advantage which is particularly important in the rippled area,
- they reduce the daily air temperature fluctuations in the occurrence of spring frosts, raise the soil temperature to a depth of 20 cm on average by 0.2 ° C,
- they are a habitat for many organisms, including useful ones, which help to combat crop pests (biodiversity).

Landslides, strips or clumps should be planted to the landscape with insufficient or inadequately placed vegetation. Since the way they are located can and should be adapted to the needs of agriculture, it should be regarded as the most important tree formation, especially in lowland woodlands.

Keywords: *trees, bounds, Household behavior, Morocco.*

EFFECT OF THE LOCALITY OF GROWING ON SWEET MAIZE PRODUCTION IN REPUBLIKA SRPSKA (BOSNIA AND HERZEGOVINA)

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Abstract

For making solid or liquid biofuels, one can use whole plants of annual or perennial species, if they form large biomass per unit area suitable for commercial processing. A large number of plants worldwide in the vegetation season yield large biomass that can be used in different ways as a source of energy. From the environmental aspect, Sudan grass could be an alternative "agricultural" crop on less fertile soil, but also an appreciated energy source in the future, due to its large biomass being a renewable source of energy. During the two-year research (2014 and 2015), researchers studied morphological and productive characteristics of the Sudan grass variety Zora grown on chernozem, namely: leaf mass, stem mass and biomass yield. The year had a statistically significant influence on the leaf mass and the biomass yield. In the second year, the mean leaf mass (20.05 g) was statistically significantly higher than in the first year (16.12 g). The results revealed the biomass was, on average, higher in the second year than in the first. The biomass yield was statistically significantly higher in 2015 (40.47 t ha^{-1}) than in 2014 (36.64 t ha^{-1}). A statistically significant positive correlation was found between the leaf mass and the stem mass (0.63), while there was a statistically non-significant positive correlation between the leaf mass and the biomass yield (0.47), as well as between the stem mass and the biomass (0.28). Data on the variability of Sudan grass are very important for the development of breeding programmes.

Key words: *agro-energy crops, biomass, genotype, morphological characteristics, Sudan grass.*

LIFE STO3RE PROJECT: FIRST RESULTS WITH NEW ORGANIC DIGESTATE

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Abstract

The LIFE STO3RE project is a demonstration project that aims to protect the aquatic environment against pollution caused by nitrates diffusion and micropollutants by means of energetically sustainable joint management of waste water treatment plants (WWTPs) sludge and manure to obtain a "biofertilizer" with high environmental quality. The LIFE STO3RE will implement an innovative and cost-effective technology (dual acid-gas temperature phased anaerobic digestion configuration, coupled to ozone oxidation and hydrothermal cavitation, $CavO_3$+DAG-TPAD) successfully developed in a previous research project. The different organic materials used or obtained from different processes carried out in the project, such as a mixture of sewage sludge and pig slurry (SS+PS); the digestate obtained after submitting SS+PS to cavitation, ozonation, and biomethanization at 55ºC and 35ºC (digestate 1) and the digestate obtained after submitting SS+PS to biomethanization at 35ºC (digestate 2) were exhaustively characterized from an agronomic point of view. Then, the researchers evaluated the effect of these organic materials, added to agricultural soil at doses of 170 kg N/ha and 85 kg N/ha, on ryegrass (*Lollium perenne*) and cardus (*Onopordum acanthium)* yield and on soil quality on the microcosm level (growth chamber with controlled temperature, moisture and light). The results showed no negative effect on the plant yields when organic materials were used as soil organic amendments; for some treatments, a positive effect on the plant yield was detected, which could be attributable to the existence of phyto-hormonal substances in the assayed organic materials.

Key words: *Biofertilizer, Methanization, Sewage sludge, Soil quality.*

Acknowledgements

This work has been supported by the EU within the LIFE STO3RE project (LIFE14/ENV/ES/000150). The authors thank to the Foundation SENECA of the Region of Murcia (Spain) for its financial support as the Excellence Research Group ref. 19896/GERM/15

AGRONOMIC VALORIZATION OF THE SLUDGE FROM THE TREATMENT OF WASTE-WATERS WITH A MICROALGAE-BACTERIA CONSORTIUM

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Abstract

The MICROALBAC project is developing an innovative wastewater treatment process using microalgae, combining the reduction of COD with the elimination of N and P in a single process with less energy and economic costs. It is about taking advantage of the symbiosis between aerobic bacteria (which need oxygen to oxidize and eliminate organic pollutants in effluents) and microalgae (which need CO_2, N and P and generate oxygen) to develop an effective process for the treatment of waste waters. In this process, an "active sludge" composed of microalgae/bacteria biomass (algal biomass, AB) is generated, whose richness in organic matter and nutrients makes it suitable for use as a biofertilizer in agriculture, benefiting the fertility and edaphic productivity of the soil where it is applied. Assays of barley (*Hordeum vulgaris*) and ryegrass (*Lollium perenne*) cultivation were carried out for two months, on the microcosm level using both conventional sewage sludge (CSS) and AB, at 6 different doses (0, 80, 100, 120 150 and 170 kg N/ha) as biofertilizers. After one and two months of growing ryegrass and after two months of growing barley, the aerial part of the plants were cut at ground level and the yields of vegetal mass were determined. Both organic materials increased the control yield at all the doses tested in both crops. The treated soils showed no pathogen content and their heavy metal contents were similar to that of the control. The treated soils showed a greater water-holding capacity, general microbial metabolic activity, phosphatase activity and β-glucosidase activity than the control soil.

Key words: *Plant yield, Soil microbial respiration, Soil hydrolase activities, Heavy metals.*

Acknowledgements

The MICROALBAC project (ref. RTC-2015-3245-5) has been supported by the Spanish Ministry of "Economía y Competitividad" and by the European FEDER financing. The authors thank to the Foundation SENECA of the Region of Murcia (Spain) for its financial support as the Excellence Research Group ref. 19896/GERM/15

IMPACT OF LAND USE ON SOIL WATER CONTENT IN A HILLY RAINFED AGROSYSTEM: A CASE STUDY IN THE CAP BON PENINSULA IN TUNISIA

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Abstract

The relation of soil moisture, evapotranspiration and vegetation is fundamental for improving management of water and soil resources on rainfed agrosystems. The present study focused on the soil moisture (SM) and the evapotranspiration (ETa) patterns in a hilly rainfedagrosystem. We analyzed five datasets from measurement at 15 sites during various crop growth cycles under the common cereals/legumes/pasture cropping systems within the Kamech catchment in Tunisia. Results indicated a strong seasonality in the precipitation and evapotranspiration dynamics that influences soil moisture patterns, with a reduction in the availability during summer (average SM = 20 mm) as compared with winter (average SM = 40 mm). This reduction was tied to higher evapotranspiration ratio in late winter and in spring (average ETa = 5 mm/day) compared with summer (average ETa = 2.5 mm/day). The data of two consecutive years showed that the spatial variation, expressed through the coefficient of variation, between the various land uses was at its highest point during this period of the year. The averaged soil moisture of the two years yielded a reasonable significant linear relation (R^2=0.67**) indicating temporal stability of spatial pattern. ETa estimated using water balance was accurate compared with energy balance during the growth cycles.

Keywords: *Soil water availability, crop water use, land use, crop sequences, agricultural hilly catchment, Tunisia.*

ASSESSING THE IMPACT OF LAND USE UNDER VERTISOLSON HYDROLOGICAL RESPONSE AND BIOMASS PRODUCTION: APPLICATION OF SWAT MODEL IN A SMALL AGRICULTURAL CATCHMENTIN THE CAP BON, TUNISIA

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Abstract

Mediterranean rainfedagricultural landscapes provide ecosystem services that are driven by land use. Assessing the impact of global changes on these services can be useful for guiding the management of these agrosystems. The present study focused on the implementation of the Soil and Water Assessment Tool (SWAT), a semi-distributed model, on Kamech, a small hilly agricultural catchment belonging to OMERE long-term monitoring system (http://www.obs-omere.org/). Calibration of models at the watershed scale is challenging because of the possible uncertainties that may exist in the form of processes simplification and the important gap relative to the lack of attention that is given to the vegetation and crop growth processes, and crack distribution across different land uses on vertisols. The aim of this paper was to contribute to the improvement of daily performance in modelling hydrological processes, erosion and biomass production in small agricultural watershed with a highly parameterized SWAT model. Measurements under the common cereals/legumes/pasture cropping systems within the Kamech catchment in Tunisia were used to adjust land management, crop and soil parameters to the different localland use practices under vertisols. Numerous spatio-temporal field observations inside the catchmentwere used to properly evaluate the ability of SWAT to mimic the spatial variability of the processes.

Keywords: *crop growth, cracks, hydrological processes, SWAT, Tunisia.*

THE DETERMINATION AND LIMITATION OF AMMONIA LOSSES FROM UREA FERTILIZERS WITHIN SOILS BY USING DIFFERENT ORGANIC MATERIALS

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Abstract

After using nitrogen fertilizers to soil, a part of the nitrogen in the fertilizer losses with volatilization are important in agriculture. Sometimes the loss of level with volatilization has reach up to 50 %. The purpose of this investigation is to determine nitrogen losses as NH_3 volatilization, effect of some factors on the losses and being limited some materials in soil samples. In the experiment, urea from the nitrogen fertilizers were applied to soil samples and these samples were dried in the closed system under constant air flow. In addition to this experiment, the ammonia losses from nitrogenous fertilizer (urea) were studied in order to limit with mixing some different organic materials (bark talk of pine (BToP), peat, straw, wood shaving) to this samples.

Keywords: *Nitrogen fertilizers, Volatilization, Organic material, Soil.*

YIELD RESPONSE OF DRIP-IRRIGATED QUINOA TO FRESH AND SALINE WATER IN AN MEDITERRANEAN ENVIRONMENT

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Abstract

In this study, the effects of full and deficit irrigation applications at various salinity levels on growth and yield of quinoa (*Chenopodium quinoa* Willd.) under the Mediterranean climatic conditions were investigated. The Danish-bred cultivar, Titicaca, was used in the field experiment which was set up in Adana, in 2012. Full, 67% and 33% deficit irrigation treatments at four different salinity levels consisted fresh water (ECw=0.5 dS m^{-1}) and saline waters at ECw=10, 20 and 30 dS m^{-1} were considered. In addition to these treatments, 50% partial root drying (PRD) with fresh water and dry, non-irrigated, treatments were included in the research. The research results showed that lack of water in the root zone and the salinity stress are two main factors affecting quinoa grain yield. In case of meeting the water requirement of plant fully with fresh or saline water up to ECw 30 dS m^{-1}, it is possible to obtain high grain yield. The range of grain yield reduction under moderate (67% or PRD) deficit irrigation treatment was 14-16% compared to full irrigation practice. The salinity and water stresses together caused more serious reduction of grain yield. The yield losses changed between 26 and 35% under severe deficit irrigation treatments (%33 of full irrigation) with saline water at ECw=10, 20 and 30 dS m^{-1}. Under conditions of water scarcity, moderate deficit irrigation is recommended in order to stabilize quinoa grain yield at an acceptable level. Saline irrigation waters with an EC level up to 30 dS m^{-1} may be used for irrigation of quinoa but care must be taken using saline water in order to prevent soil salinization absolutely with an effective water management strategy.

Keywords: *Quinoa, irrigation water salinity, deficit irrigation, partial root drying.*

MODELING OF THE MIDDLE BLACK SEA REGIONAL SOIL TEMPERATURES BY THE METHOD OF ARTIFICIAL NEURAL NETWORKS

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Abstract

In this study, an artificial neural network (YSA) model was developed to estimate the soil temperatures in different soil layers (5, 10, 20, 50 and 100 cm) of Turkey Middle Black Sea Region. Soil temperature values of the provinces between 1971 and 2015 were obtained from the General Directorate of State Meteorology Affairs (DMİ). The input layer of the model forms depth, air temperature and moon information. Monthly average soil temperature values are in the output layer. In the obtained data set 240 data were used in the learning process, 120 data sets were used in the test process and 180 data sets were used in the verification process. A prediction model is constructed using MATLAB program and the results are compared with actual values. For all stations at different depths, the detection coefficient (R^2) ranges from 0.854 to 0.994, the square root of the mean of the error squares (RMSE) ranges from 0.240 to 3.745, and the mean absolute error (MAE) ranges from 0.011 to 2.333.

Keywords: *Soil Temperature, Artificial Neural Networks, MATLAB*.

"A WALK TO A BETTER FUTURE", A STUDY ON THE FUNCTIONS OF SIDEWALKS, NIGDE CITY EXAMPLE

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Abstract

Maintaining the natural environment interractions with the dynamics of the living environment in an entire or some part of a city is an important subject in landscape architecture. Using living and non-living elements existing in the nature, sidewalk areas in the cities can be improved in terms of certain standards depending on time and space. It is necessary from the sociological and psychological point of view that all individuals with different characteristics have to spend time together and have active or passive activities in common places. Sidewalks are built in order to protect pedestrians from dangers in the complexity of intensive motor vehicles usage and pedestrian traffic of the cities. Sidewalks are not only built for safety reasons, they can also provide passive green spaces. When the sidewalks are designed in avenue style, they become more attractive for walking, reducing the use of the vehicles, and can contribute to the ecology by reducing air pollution. In addition to these, more accessible sidewalks can and should be built with care for disabled to encourage them for outside activities. Our aim is to make proposals from landscape architecture viewpoint for creating versalite sidewalks that will contribute to a better future in the context of the mentioned topics.

Keywords: *Ecology, Landscape Architecture, Niğde, Sidewalk.*

USING INDIGENOUS PLANT SPECIES RANGING ON THE CAMPUS AREA OF ÖMER HALİSDEMİR UNIVERSITY (TURKEY) IN LANDSCAPE DESIGN WORKS

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Abstract

Selection of plant material for landscape architecture is highly substantial. Use of species from indigenous vegetation increases chances of success in applications being an economic approach and providing the integrity of the city with its neighborhood. A previous study on flora on the campus of Ömer Halisdemir University (Turkey) has shown that 405 taxa from 74 families and 262 genus exhibited indigenous distribution. In this study, some of the indigenous plant species on the campus were evaluated from ecological, aesthetical and functional points of view of and 14 of them were projected to be eligible to be used in landscape areas. Specified species were given below along with their Latin and Turkish names with their biological, ecological characteristics and photographs. Since they naturally range within circumstances of Niğde, their habitats were also studied and samples of landscape designs with these species were drafted/presented, prepared. Specified species are *Butomus umbellatus* L., *Colchicum triphyllum* G. Kunze, *Crocus chrysanthus* (Herb.) Herb., *Cyperus longus* L., *Gladiolus atroviolaceus* Boiss., *Iris orientallis* Mill., *Juncus articulatus* L., *Juncus conglomeratus* L., *Lamium orientale* (Fisch. & C.A. Mey.) E.H.L. Krause, *Phlomis armeniaca* Wild., *Phragmites australis* (Cav.) Trinex Steud., *Tulipa humilis* Herb., *Typha angustifolia* L. and *Zygophyllum fabago* L.

Keywords: *Endemic Plant, Landscape Design, Natural Plant, Nigde, Omer Halisdemir University.*

FOOD SUPPLY OF TURKEY UNDER PARIS CLIMATE AGREEMENT

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Abstract

Climate change is one of the major environmental threats of our time. It is affecting and will continue to affect society in many ways, particularly the economy. The 2014 Intergovernmental Panel on Climate Change (IPCC) report projects that the climate warming is likely to exceed 2 degrees Celsius the next 30 years, and estimates that we have already seen a warming of about 1°C since 1900. On the other hand, regionally the Hadley Center Model (HADCM) and Canadian Center Climate Model (CANCG), project that by 2050 in Turkey the annual mean temperature will increase by 2- 4 degrees Celsius and annual precipitation will decrease by 1-2 mm/day in. The Paris Agreement, as last international agreement related to climate change, brings all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects, with enhanced support to developing countries. The major aim of the Paris Agreement is to strengthen the global response to the threat of climate change by keeping a global temperature rise in this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius. Additionally, the agreement aims to strengthen the ability of countries to deal with the impacts of climate change. The aim of this research was to determine impact of 1.5 degrees Celsius change on Turkish main food products supply. The main material of the research was gathered from Turkish Statistic Institute and General Directory of Meteorology of Turkey. The biophysiological and economic models were set up and the impacts were determined for the scenario with 1.5 degrees Celsius change for wheat, corn, sugar beet, legumes, rice, milk, the main food stuffs for Turkey. Year 2014 was selected as the base year of the models. Results showed that 1.5 degrees Celsius increase in temperature would lead to yield changes negatively affecting food supply decreasing it from 2.9% to 7.3%. With decrease in yield and production, the economic losses were projected as 2.4 billion TL.

Keywords: *Food supply, climate change, Paris Agreement, Turkey.*

INVESTIGATION OF CADMIUM AND PHOSPHORUS CONTENTS OF GREENHOUSE SOILS IN ANTALYA-AKSU DISTRICT

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Abstract

One of the main factors of cadmium (Cd) increase in agricultural areas is phosphorus fertilizers. The aim of this study is to determine the content of Cd in the greenhouse areas where too much phosphorus fertilizer is used. Soils (0-30 cm and 30-60 cm soil depths) taken from the greenhouse areas in Aksu district were used as material. According to the random sampling method, the soil was taken from 20 greenhouses. According to the obtained data, the total and available Cd contents in samples taken from 0-30 cm soil depth were significantly ($P< 0.01$) greater than that of samples taken from 30-60 cm depth. Moreover, a similar trend is also valid for the available phosphorus in 0-30 cm soil depth. Similarly, the statistically significant positive relationships were observed between total and available Cd and P levels at both soil depth. These results pointed out that higher fertilizer-P applications were the major source of Cd entry into the soil in the research area.

Key words: *Soil, cadmium, phosphorus, accumulation.*

CHANGE OF SOIL PROPERTIES IN AN AMELIORATED PASTURE IN A LONG-TERM PERIOD

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Abstract

In this study, effects of pasture amelioration studies between 2006 and 2011 on soil properties after 3 years in natural pasture soil of Minöz Creek Basin in Turkey were investigated. Pasture amelioration methods were: two controls under uncontrolled (C) and controlled grazing (CG), fertilizing (F), spread seeding (SS), aeration (A), spread seeding+fertilizing (SSF) and polyacrylamide (PAM). Some soil properties, such as salinity (EC), soil reaction (pH), organic matter (OM), aggregate stability (AS), mean weight diameter (MWD), soil moisture, penetration resistance (PNT), bulk density (DB) and infiltration rates (I) were determined. Pasture amelioration methods have shown positive effects on soil properties depending on year (2006-2011). When comparing 2011 with 2006, decreases in MWD and DB values and increases in EC, pH, OM, AS, PNT and I values were determined. The highest values for OM was 4,17% in 2006 and 5,55% in 2011. AS was 58,16% in 2006 and 61,5% in 2011 and I was 16,41 cm h^{-1} in 2006 and 256,42 cm h^{-1}. When comparing 2014 with 2011, decreases in EC, pH, OM, AS, PNT and I values and increases in MWD and DB values were determined. In 2014, decreases in soil properties were determined as OM to 1,95%, AS to 51,9% and I to 7,38 cm h^{-1}. The highest DB value 1,57 gr cm^{-3} in 2011 increased to 1,71 gr cm^{-3} in 2014. AS values decreased in 2014 depending on the decreases in OM values and increases in DB values. The mean values for the soil properties in 2011 changed as OM 4,13% decreased to 1,49%, AS 56,80% decreased to 45,35% and DB 1,44 gr cm^{-3} increased to 1,58 gr cm^{-3} in 2014. The results indicated the importance of pasture amelioration methods for sustaining and improvinglimited low quality pastures in the region. In application deficiencies, the unfavorable conditions of pasture can be achieved in 3 years. The fastest and the highest degradation in pasture were determined as increases in DB values and decreases in AS values depend on the decreases in OM values. The longest effect and minimum change were determined in EC and pH values.

Keywords: *Pasture amelioration, Soil properties, Sandy loam soil, organic matter, PAM.*

EFFECT OF CONSECUTIVELY TWO YEARS TREATED SEWAGE SLUDGE APPLICATIONS ON CORN AND SECOND CROP WHEAT YIELD AND SOME SOIL PROPERTIES OF SANDY CLAY SOIL

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Abstract

In this study, effect of consecutively two years treated sewage sludge (TSS) applications on corn and second crop wheat yield and some soil properties of sandy clay soil (Typic Xerortent) were investigated. The field study was conducted in 20 plots in a randomized-block design with four replications and five different applications including control, mineral fertilizer, treated sewage sludge 12.5 $Mg.ha^{-1}$, 25.0 $Mg.ha^{-1}$, 37.5 $Mg.ha^{-1}$ as dry matter during 2011-2012 in Menemen-İzmir, Turkey. Corn (*Zea mays* L. var. ZP 737) and wheat (*Triticum durum* L. var. Ege 88) were sown as the first and second crop respectively. During the experiment, soil samples were taken five times in two years. Consecutively two years increasing TSS applications to sandy clay soil resulted in significantly increased total biomass and grain yield of corn according to the control. The highest grain yield of wheat as second crop was found with the highest TSS application. Increasing treated sewage sludge applications significantly increased total N, plant available P and K, total salt, $CaCO_3$, OM content and CEC of sandy clay soil as average of 5 sampling periods. However, it was found that, there is no statistical relationship between TSS levels and pH values of soil samples of 1st, 2nd, 3th and 5th periods when compared with the control. It can be recommended that 37.5 $Mg.ha^{-1}$ TSS as dry matter can be added for improving plant nutrients and soil properties of sandy clay soil under Mediterranean climate, which are characterized by low OM content and high pH.

Keywords: *Corn, Sandy clay soil, Sewage sludge, Soil properties, Wheat.*

MONITORING AND ASSESSMENT OF PHYSICOCHEMICAL PARAMETERS OF SOILS AND COALS USED IN BRICK KILNS AND THEIR IMPACT ON HEALTH AND ENVIRONMENT

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Abstract

To assess the heavy metals in soil and coal used in Brick kilns and to monitor the air pollution awareness at Madhupur union in Rangpur district in Bangladesh a study was conducted from January 2015 to June, 2017. Soil and coal samples were randomly collected from six brick kiln areas followed by analysis using Atomic Absorption Spectrophotometer. The farmers' awareness on metal's impact on health nearby the investigated brickfield areas was surveyed using questionnaire and personal interview. The results revealed that the deposition of fly ash or residues after combustion of coal burning produced notice worthy effects on the soil quality. The mean concentrations of Cr and Pb in the soil of the brick kiln area were 59.54 and 25.84 mg/kg, respectively and the mean concentrations of the Cr and Pb in the coal were 27.15 and 45.87 mg/kg, respectively. The concentrations of Cr and Pb in soil were found in uncontaminated in nature but Pb of coal were high in UBC-3 brick kiln area and higher than permissible limit. This would negatively impact on human health and crop production. The survey findings revealed that majority of the farmers had medium level of awareness on health impact and air pollution nearby the brickfield areas. Farmer's characteristics like academic qualification, extent of media contact, knowledge and vulnerability on air pollution had significant positive relationship with their awareness on air pollution. So, awareness should be built up against traditional brick making industries through adopting energy efficient clean technology in brick kilns.

Keywords: *Heavy metals, soil and coal, brick kiln, air pollution, deposition of fly ash, Bangladesh.*

DEFINING OPTIMAL LOCATIONS OF ESTABLISHMENTS AND TRANSPORTATION ROUTES FOR TREATMENT AND STORAGE OF ANIMAL WASTE

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Abstract

In order to ensure a high level of public health and animal health protection in Bosnia and Herzegovina, it is necessary to improve the existing and/or provide quality management of animal by-products, i.e. to establish an infrastructure for quality and efficient treatment/disposal of animal by-products and waste of animal origin. This implies a wide range of activities in this field, such as measures to improve the legal and institutional framework, better data system management, establishment of by-product management model including transport solutions and technologies and provision of an adequate financial framework and sources of funding. At this point, the issue of management of animal by-products and animal waste in Bosnia and Herzegovina has not been adequately addressed and poses a threat to both human and animal health. In this regard, establishment of a sustainable management system for animal by-products and animal waste is of utmost importance for further development of BiH agriculture. Inadequate management of animal by-products and animal waste poses a huge threat to the environment, endangering natural resources, watercourses, sources of drinking water, soil and atmosphere. This paper presents some of the activities related to establishment of this infrastructure, relating to the methodology of selection of locations for central plant and intemediate establishments for treatment and collection of animal waste and the definition of optimal transport routes and transport capacities.

Key words: *animal by-products, animal waste, multi-criterial optimization, location analysis, categorization of animal waste.*

STUDY OF THE AGROECOLOGICAL TRANSITION IN EXTENSIVE AGRICULTURE IN THE SEMIARID REGION OF CÓRDOBA, ARGENTINA

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Abstract

Extensive agriculture in the semi-arid region of Córdoba, Argentina, generated an intense degradation of the biophysical environment, a decrease in ecosystem self-regulation mechanisms, a considerable reduction of agrodiversity and the loss of associated environmental services. The physical-biological responses of different agroecological practices were evaluated for ten years in permanent macroplots located in three agricultural systems in order to study the transition towards more sustainable systems, which can be extrapolated to the rural area of central Córdoba. This process generated local information compatible with the farmers' technology. The results showed that *winter cover crops* allowed good weed control. Although they affected the soil water content, they did not produce significant differences in summer crop yields and they increased the level of surface organic carbon, thus mitigating the edaphic densification processes caused by no till farming in the medium term. *Crop rotation* contributed with more organic carbon to the system. *Open-pollinated maize varieties* produced a good yield of grains and biomass, even in years of marked water deficits, showing their adaptation to semi-arid conditions and their good plasticity. *Fertilization with vermicompost* in reduced doses increased grain yields and biomass production. The integrated management of these practices improved the balance and biological interdependencies that favoured biotic regulation between phytophagous and predatory arthropod populations as well as the regulation of spring weed populations.

Keywords: *Permanent macroplots, Agroecological practices, Semi-arid environment, Extensive crops.*

EFFECT OF CLIMATE ON SOIL ORGANIC MATTER IN FARMING SYSTEMS IN FOUR REGIONS OF GERMANY

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Abstract

Soil organic matter (SOM) has long been considered as a key factor in sustaining the physical, chemical and biological properties of soil. A network of 40 pairs of organic and conventional farms across four regions of Germany was established with focus on research on climate impacts and sustainability indicators in agricultural production. In one part of the joint project "Climate Effects and Sustainability of Agricultural Systems – Analyses in a Network of Pilot Farms" soil chemical, biological and physical properties were investigated. We aimed to study the influence of climate (precipitation, temperature and altitude) on SOM (Corg and Nt) in four regions (East, South, West and North) of Germany. To analyse different effects on soil properties soil samples were taken between 2009 and 2011 on 80 farms (10 pairs neighbouring farms in four regions). The measurements are based on 197 plots located on cropland and 56 plots located on grassland. The data was analysed with cluster analyses. The analysis created and compared four groups with similar climate data and four groups of plots with similar Corg and Nt. In cropland 49.8% of the plots with similar climate data had similar SOM in depth 0-30 cm, in grassland in depth 0-10 cm 42.9% of the plots and only 26.8% in depth 10-30 cm. The results suggested a higher effect of climate variables on SOM in cropland than in grassland. The differences might be caused by different site conditions. For further research, other site conditions (soil texture, ground water etc.) will be included.

Keywords: *Carbon, Nitrogen, Precipitation, Grassland.*

EVALUATION OF THE EFFECT OF NEW ORGANIC-MINERAL FERTILIZERS ON SOIL PROPERTIES

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Abstract

The decreasing content of soil humus makes it necessary to search for a cheap and safe source of organic matter. The concept of organic-mineral fertilizers combining the advantages of organic and mineral fertilizers has emerged in recent years. Utilization of such fertilizers is recommended in particular for sandy soils characterized by low capacity of the sorption complex. The introduction of organic-mineral fertilizers stabilizes the content of organic carbon in soil, reduces nutrient losses from mineral fertilizers, and contributes to the reduction of mineral fertilizer consumption in agriculture. The aim of this study was to evaluate the value of organic-mineral fertilizers produced from spent mushroom substrate. The study was conducted on the basis of microplot experiments on sandy soil. Four organic-mineral fertilizers produced from the spent mushroom substrate with the addition of various mineral fertilizers (urea, ammonium nitrate, triple superphosphate and potassium salt) and two fertilizers from the sewage sludge and spent mushrooms substrate were tested. The results showed a beneficial effect of organic-mineral fertilizers on the selected physico-chemical properties of the soil. Organic-mineral fertilizers significantly affected the increase of the soil pH, increase in the content of organic carbon (5-24%) and total nitrogen (25-32%) in the soil as well as increase in the available forms of phosphorus (1-79%) and potassium (1-12%) in soil.

Keywords: *Organic-mineral fertilizers, Spent mushroom substrate, Soil.*

POSSIBILITIES OF USING ORGANIC WASTE TO INCREASE THE FERTILITY OF MARGINAL SOILS

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Abstract

In areas where soils are poor (low organic matter and nutrient content) due to their geological history, or dried out due to lack of water holding capacity, agricultural productivity may be low. Until 2007, low productivity sites were abandoned, and the area under obligatory set-aside amounted to 3.8 million hectares in the EU. Considering average trends, yields from such areas would likely bring around 10 million tons grains onto the market. However, in many places the potential yields are not realized and better agricultural practices could probably give much larger food production. The aim of this study was to evaluate the value of composts produced from different organic wastes. The study was conducted on the basis of microplot experiments on sandy soils. Three composts were tested in the experiment: compost 1 (spent mushroom substrate, bio-rest from biogas production and straw), compost 2 (sewage sludge, brown coal and straw), and compost 3 (poultry manure, potato peelings and fruit pomace). The tested plant was maize. The results have shown a beneficial effect of composts on the selected physico-chemical properties of the soil and yield of plants. Composts significantly affected the increase in the soil pH, increase in the content of organic carbon and total nitrogen in the soil as well as increase in the available forms of macro-elements in soil. Yield of maize increased from 10 to 30% in relation to the control. From among all tested fertilizers, compost 1 was characterized to have the best influence on the analyzed soil properties and maize yield.

Keywords: *Organic wastes, Spent mushroom substrate, Soil properties.*

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CHANGING THE CLIMATE IN THE CONTEXT OF SUSTAINABLE AGRICULTURE

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Abstract

The research is circumscribed to the latest global concerns. We note that the field research has evolved a lot, due to several reasons:

- the importance of ensuring sustainable development;
- the role that agriculture has in the economy and society;
- growth of risks in agriculture due to climate change;
- high volatility of outputs, costs, prices and incomes on farms.

In this respect, in order to carry out this research, a significant role belongs to the identification of the different types of severe meteorological phenomena and the agro-climatic risk aspects. Thus, first of all, the phenomenon of agricultural drought will be described, starting from a general look at the definitions, concluding that at the conceptual level in the literature the definitions of drought are numerous and are based on the meteorological parameters, singular And/or in combination, but in direct correlation with the moisture requirements of the plants during the main phases and specific interfaces of vegetation. A drought-related damage dimensioning is also carried out according to the intensity and duration of disturbing factors (winter drought, spring drought, summer drought, autumn drought). Also, the characterization of the above-mentioned phenomenon is made, starting from agrometeorological/agro-climatic parameters of risk/thermal, atmospheric and hydric stress, defining, characterizing and identifying the singular and/or complex production of the agricultural drought phenomenon. The following result, the selection of the agro-climatic risk types according to the main characteristics of production and effects (materialized in a risk taxonomy), was obtained on the assumption that an overview of some definitions of the agro-climatic risk types defined by the indices Agrometeorological and agro-climatic shows that the risk/thermal stress or water stress can be classified according to the basic criterion used in the analysis and assessment of the effects on each agricultural species. It was also considered that agrometeorological/agroclimatological literature specifies the agro-climatic risk types based on agrometeorological/agro-climatic parameters singly or in combination and in direct correlation with the requirements for plant vegetation conditions by phases and Specific interfaces, as well as the active season as a whole. Thus, the types of thermal and hydric risk, respectively the heat, rainfall and atmospheric, pedological and agricultural drought, defined and characterized according to the specific criteria of analysis, the taxonomy of the risks was made. For each type of agro-climatic risk, three levels of risk characterizing vulnerability to thermal and hydrological risk have been identified - excessive, strong and moderate risk.

Keywords: *Biodiversity, Climate Change, Desertification, Sustainable Development*.

QUALITY OF IRRIGATION WATER IN AUTONOMOUS PROVINCE OF VOJVODINA IN SERBIA

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Abstract

One of principal goals of intensive crop production is the achievement of quality yields, which would provide satisfactory economic gain. Although this type of production implies the use of chemicals for crop protection and mineral fertilizers, its excessive and inappropriate use leads to degradation of arable lands. Besides, improper irrigation and use of water of inadequate quality decrease the credit value of soil. This kind of irrigation can lead to accumulation of soluble salts in a layer of active soil rhizosphere, causing salinization and creating stress conditions for the life of plants. In order to determine irrigation water quality at the territory of Autonomous Province (AP) of Vojvodina, 28 samples were collected during 2015. The following parameters for quality evaluation were analyzed in collected samples: pH value, electro conductivity, dry residue, the ionic balance, and SAR value (Sodium Adsorption Ratio), as an indicator of relative activity of water soluble Na in adsorption reactions with soil. According to the classification of irrigation waters of US Salinity Laboratory, compared to the values of total concentrations of ionized constituents and ionic balance, out of total number of tested samples, 10 water samples (35.7%) belong to the class C3-S1, while other samples (64.3%) belong to the class C2-S1. Results showed that water is salty (C3), to medium salty (C2), with low content of Na (S1), which can lead to salinization, but not to alkalization of poorly drained soils. According to modified FAO classification of irrigation waters, water samples from class C2-S1 have good quality, while waters from class C3-S1 are of lower quality. Considering that, special measures are required to prevent salinization, as well as the selection of crops highly tolerant to salts. While the largest part of tested irrigation water samples was of good quality, continuous water and soil control is necessary in order to test its salinity, which is a restraining factor in crop production.

Keywords: *Irrigation water, classification, salinity.*

BEE HONEY AS AN INDICATOR OF ENVIRONMENTAL POLLUTIONS BY HEAVY METALS IN SOHAG, SOUTH EGYPT, EGYPT

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Abstract

The present study aims to estimate the distribution and speciation of heavy metals in bee honey that is useful in assessing possible chemical pollution and perceiving pollution sources. The fine fraction was analyzed for the metal content (Co, Ni, Cu, Pb, Cd, Fe, Mn and Zn)- to study the importance of honey as indicator of environmental pollution and the relationship between pollution and contamination of the environment honey samples and soil heavy metals. Were collected 47 samples (30 honey and 17 soil samples) from 22 areas near sources of pollution such as factories and roads and gathering population and sanitation has been analysis of soil samples near the apiary from which the honey samples, represents five governorates: Sohag, Qena, Luxor, Aswan and the New Valley in the period from 2011-2012. These samples were collected during the flow and before the trading and marketing to ensure the quality of honey samples by compiled and vowed not to cheat, then it was estimated concentrations of eight heavy metals using atomic absorption spectrophotometer. Mean values of heavy metals in honey were 0.437, 0.166, 0.225, 0.104, 0.411, 0.525, 0.209, and 0.253 mg/kg for Zn, Mn, Fe, Pb, Cd, Cu, Ni, and Co, respectively. Mean higher values each of Cd (0.908) and Ni (0.657) in Qena, Zn (0.838), Co (0.694) in New valley, Higher values of Zn, Mn, Fe, Pb, Cd, Cu, Ni and Co in soil samples were 4.400, 4.650, 4.800, 2.400, 1.965, 3.400, 1.600 and 2.200 mg / kg, respectively. The correlation between the presence of elements of honey and soil, found low correlation with each of Fe, Pb, Cd and Cu elements, while a negative correlation with Zn, Mn, Ni and Co. Because of the diversity areas from which the samples and the different environment in each sample in terms of the source plant, geographical location, topography and climate of each region, and also this study showed that the concentration of elements in bee honey were within the acceptable limits by comparison with other study in other countries in the world. The results obtained by this study confirm the possibility of using honey as an indicator of environmental contamination with toxic heavy elements.

Keywords: *Bee honey, Heavy metals, Environmental pollution.*

ACCUMULATION OF HEAVY METALS IN THE WILD FOREST MOUNTAINS OF EASTERN KAZAKHSTAN

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Abstract

Forest berries are an essential biological resource that provides the population with a complex of mineral, organic substances, and medicinal properties. Wild berries are widely distributed in the mountain forests of Eastern Kazakhstan. Research requires the ecological safety of these resources in the system "plants-food products", since there are significant industrial enterprises in the region that determine the biogenic migration of toxic elements. The aim of the research was to study the gross concentrations of heavy metals in the berries of the mountain forests of Eastern Kazakhstan, harvested for use as food. The research subjects were *Ríbes rúbrum L.*, *Rósa aciculáris Lindl.*, *Vaccínium myrtíllus L.*, selected during the expeditions in 2016 on the territories of the forest ecosystems of Rudniy Altai. Heavy metals were determined by the method of atomic absorption spectrometry. The results of the studies showed that the chemical elements studied were installed in all samples. The range of heavy metals in Cu content was within the range of 3.44-4.84 mg/kg, for Zn – 8.02-9.3 mg/kg, for Mn – 32.7-37.3 mg/kg, for Pb – 0.25-0.31 mg/kg, for Co– 0.4-0.43 mg/kg, for Cd–0.02-0.026 mg/kg. Analysis of the concentration of heavy metals in the selected samples showed no excess of the maximum permissible levels. However, in some samples, the concentrations of detected heavy metals reached the boundary of the permissible limits. The obtained results of research characterize the wild berries of the forest areas of Eastern Kazakhstan as safe for use in food and medicinal purposes.

Keywords: *environmental monitoring, heavy metals, plant resources, Kazakhstan.*

THE EFFECTS OF IRRIGATION ON THE STRUCTURAL STABILITY OF MICROAGGREGATES AND THE RISK OF SOIL CRUSTING IN THE MORAVICA ADMINISTRATIVE DISTRICT IN THE REPUBLIC OF SERBIA

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Abstract

During 2016, on agricultural soils of Moravica Administrative District, under irrigation systems were carried out research of the effects to the structural stability of micro aggregates and the risk of crust formation of the irrigation measures applied. Soil samples were sampled in a disturbed condition from the surface horizon at a depth of 0-30 cm from twenty locations. Level of stability of micro aggregates, expressed by Vageler's scale, is determined based on the ratio of total content of the particles of clay in the soil sample prepared with pyrophosphate, and the content of clay particles in a suspension of soil prepared with the water. The risk of the soil crusting was determined according to a Van der Watt & Claassen pattern based on the ratio between the content of organic matter, and total content of the clay and dust particles in soil samples. Based on processed result, it was prepared an assessment of whether and how irrigation affects the structure of soils type fluvisol, vertisol, humogley, cambisol and stagnosol, on which the research were conducted. The obtained results, shows that the tested soil samples, according to the classification by level of stability of micro aggregates by Vagler-in, are belonging to the level of very stable aggregates. In relation to the risk of crust, 50.00% of the samples had a high risk area, 37.50% borderline risk, and at the 12.50% of the samples, a risk of crust was at a low level.

Key words: *irrigation, structural aggregates stability, soil crusting.*

AGRI-ENVIRONMENT AND CLIMATE ACTION AS AN INSTRUMENT TO PROTECT THE DIVERSITY OF POLAND LANDSCAPE

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Abstract

One of the key objectives of the Common Agricultural Policy is to promote environmentally friendly agricultural practices. Agri-environmental and climatic action in the financial perspective of 2014-2020 is an instrument to implement and promote agricultural practices that aim to protect waters, soils, precious natural habitats, endangered species of flora and fauna and protect landscape diversity. Activities undertaken by farmers within this measure have undoubtedly influenced biodiversity in the countryside. In addition, compliance with the agri-environmental requirements of the individual packages by the beneficiaries is conducive to the rational use of nature resources and the reduction of the negative impact of agriculture on the natural environment. The essence of this action is the use of payments to compensate for costs and lost revenue, to farmers who voluntarily apply production methods to protect the environment. The purpose of this article is to analyze the use of EU funds by national beneficiaries as part of their participation in the "Agri-environmental-climate" action implemented in seven climate packages, ie *Sustainable Agriculture, Soil and Water Conservation, Orchard Conservation of Traditional Fruit Trees, Valuable Habitats and Endangered Species Birds in NATURA 2000 areas, precious habitats outside the NATURA 2000 areas, preservation of endangered genetic resources of plants in agriculture and preservation of endangered genetic resources of animals in agriculture*. The research material is data originating from The Agency for Restructuring and Modernization of Agriculture (ARMA) concerning applications submitted by farms. Calls for proposals were held from March 15, 2014 till June 10, 2016. The object of the research was an analysis of the activity of Polish applicants. The article used the descriptive and tabular method of statistical data analysis. In addition, the purpose of the analysis was to analyze the literature of the subject.

Keywords: *Agri-environmental-climate, the Common Agricultural Policy, European Union.*

EFFECT OF MAGNETIC WATER ON NUTRIENTS AVAILABILITY IN SOILS AND ITS UPTAKE BY PLANTS

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Abstract

Optimal management of water as one of the main inputs in the supply of essential plant nutrients has played a major role in increasing the production of food to a continually growing world population. Magnetic water treatment techniques have shown promising potentials in different areas, especially in agriculture. The aim of this study was to evaluate the effects of magnetized water treatments on nutrients availability in soils and its uptake by plants under saline and non-saline conditions. A magnetic treatment device with its magnetic field in the range of 8–10 mT was used for the magnetic treatment of irrigation water. This experiment was performed as factorial in a complete randomized design (CRD) with two factors (water and salinity). Treatments consisted of two levels of water, normal and magnetized, and three levels of salinity, 800, 1600 and 2100 mg L^{-1} NaCl, with three replications. The plants grown in this study were bean (*Phaseolus vulgaris*), and corn (*Zea mays*). At the beginning, the bean and corn seedling germination parameters were measured; then, the morphological characteristics of the plants measured at the end of the experiment; also the chemical analysis of soil, water and plants samples was performed. The results revealed that the magnetic field (MF) had non-significant effect on the chemical properties of water; however, the study of water absorption spectrum in infrared region showed that the polarization and diffusion of water molecules increased, and thickness of hydrated radius of water ions decreased. As to soil properties after plants harvest, there was also non-significant effect of magnetic water treatment on soil properties by any of the two types of plants tested in this study. The results also demonstrated that the physiological, and morphological characteristics of corn and bean were significantly affected by magnetized water ($P<0.01$). Evaluating the effects of saline magnetized water on uptake of essential nutrients by roots, stems, leaves and seeds of bean and corn, showed that magnetic water significantly increased nutrient uptake in leaves and seeds; however, this enhancement in roots and stems were non-significant. The analysis of the data collected during the study suggests that the effects of magnetic treatment varied with plant type and the type of irrigation water used, and there were statistically significant increases in plant yield and water productivity.

Keywords: *Bean, Corn, Essential Plant Nutrients, Magnetic Water, Salinity.*

5. ANIMAL HUSBANDRY

THE COMPONENTS OF LITTER SIZE IN RABBITS OF THE LOCAL ALGERIAN POPULATION AND A SYNTHETIC LINE

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Abstract

Higher litter size at birth has been reported in female rabbits of a synthetic line than in those of the local Algerian population. The aim of this work was to analyze whether this difference in litter size is related to a difference in the main components of litter size. The experiment has been carried out at the rabbitry of the University Saad Dahleb, Blida from July to January 2016. In total, 32 and 34 nulliparous rabbits of the synthetic line and local population were used in this experiment. At the 3rd parity, the pregnant females underwent endoscopy on Day12. In the rabbits of the synthetic line, the ovulation rate and the total number of implanted embryos were significantly higher (+ 23%, P <.0001). Embryonic, fetal and prenatal survival rates were comparable between the two groups. In addition, the synthetic females show higher total born kits (+ 16%, P <0.05). Finally, the number of dead-born kits, the percentage of stillborn kits and neonatal survival were comparable between the both groups of females. In conclusion, the improvement in litter size observed in the synthetic line is related to a higher ovulation rate rather than to changes in prenatal mortality.

Keywords: *rabbit, local population, synthetic line, litter size, ovulation rate, prenatal mortality.*

EFFECT OF 24 HOURS OF FASTING ON THE PERFORMANCES OF RABBIT DOES: REPRODUCTIVE TRAITS AND METABOLIC PARAMETERS

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Abstract

The aim of this experiment was to study the effect of 24 hours fasting before mating on performances and blood metabolites of rabbit does. In total, 20 nulliparous rabbit does were divided into two groups (CG: control group, fed ad libitum (n=10) and FG: fasted group, deprived of food for 24 hours before mating (n=10)). The sexual receptivity was checked during one week before the day of mating by evaluating vulva color. Blood samples were collected during the last 2 hours of fasting and the following 2 hours after the mating, and each 30 minutes of interval. Both groups presented a similar receptivity during the week preceding the mating ($P<0.05$). At mating, the FG showed a higher receptivity than the CG (66 *vs.* 44%; + 33%, $P<0.05$). The FG presented lower blood glucose and cholesterol concentration (-10%; $P<0.05$). At 30 minutes after re-feeding, the females presented the same values of these last two parameters. The litter size at birth was significantly higher in the FG (7.4 vs. 5.2; $P<0.05$).

Keywords: *rabbit, fasting, food, glucose, cholesterol, litter size.*

STUDY OF SEMEN QUALITY AND PERFORMANCES OF RABBIT DOES IN NATURAL MATING AND ARTIFICIAL INSEMINATION

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Abstract

The aim of this work was to study the quantitative and qualitative characteristics of the semen of 3 rabbit breeds and to compare the reproductive performances of the females in natural mating (NM) and artificial insemination (AI). In total, 21 males aged 4 months were divided into 3 groups of 7 each (Local population, Californian and Hybrid). Throughout the experiment, two successive ejaculates were recovered from each male, twice a week and for a period of 6 weeks in order to characterize their semen. In addition, 20 nulliparous rabbit does were divided into two groups of 10 each (group of females conducted in artificial insemination (AI) and natural mating (NM)). No significant difference was found between the 3 male groups for ejaculate volume (1.11 ± 0.43 ml; P> 0.05), pH (7.16 ± 0.18) and individual motility (2.36 ± 0.4, P> 0.05). In contrary, Local males showed higher massal motility compared to Hybrid rabbits (+ 30%, P<0.05) and Californian rabbits (+ 27%, P<0.05). The concentration of spermatozoa per ejaculate was comparable between Hybrid and Californian rabbits. However, it was significantly lower in Local males (-30%, P<0.05). Concerning the female performances, the fertility rate was 76.92% in NM compared to 53.84% in AI. The total number of kids was higher in NM than in the AI (6.5 ± 1.25 *vs*. 5.42 ± 1.90). However, the difference recorded was not significant (+ 16%; P<0.05). The number of stillborn was similar in both groups of females. The number of weaned rabbits at 30 days and the mortality between birth and weaning were respectively 4.6 ± 1.50 and 38.80% in NM and 4 ± 1.2 and 35.71% in AI. The use of artificial insemination in Algeria for the first time has done very encouraging results.

Keywords: *rabbit, semen, characterization, zootechnical performances.*

COMPONENTS OF LITTER SIZE IN RABBITS OF LOCAL ALGERIAN POPULATION AND SYNTHETIC LINE: UTERINE CAPACITY AND FETAL DEVELOPMENT

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Abstract

The aim of this experiment was to compare the uterine capacity and some factors affecting the fetal weight at the 25th day of pregnancy. Fourty-seven uniovariectomized multiparous rabbit does (27 Synthetic line and 25 Local Population) were mated, then sacrificed on the 25th day of pregnancy.In Synthetic line females, the ovulation rate and the number of implanted embryos were higher (+ 26%, P <0.001). At the same ovulation rate, no difference between both groups was noted for these two last parameters. Embryonic, fetal and prenatal survival rates were comparable between females. The Synthetic line fetuses had a lower weight (-20%, P <0.001), reduced size (-3%, P <0.01), poor development of internal organs (-22.9%, P <0.01) and lower development of placentas (-18.8%, P <0.001). The fetuses implanted in the oviductal position has shown a better weight compared to those implanted in the median position of the uterine horn (+ 5%, P <0.05). Similarly, fetal organ weights, available uterine space, amniotic liquid volume and fetal placenta weight are related to the intra uterine position, the best performances are recorded for the fetuses implanted near to oviduct. The effect of fetal vascularization is highly significant on all parameters measured in favor of fetuses receiving a number of blood vessels ≥6. No significant effect of fetal sex was recorded. The litter size measured at the first three parities was higher in SS females (+ 24%). In conclusion, the higher litter size at birth recorded in rabbit of Synthetic line is mainly due to a higher ovulation rate rather than to the improvement of their uterine capacity.

Keywords: *rabbit, Local Population, Synthetic line, uterine capacity, litter size, fetal development.*

STUDY OF THE PROLIFICACY IN RABBITS OF LOCAL ALGERIAN POPULATION AND SYNTHETIC LINE: EFFECT OF PARITY, LACTATION AND SEASON

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Abstract

The objective of this work was to characterize the litter size in rabbit does of Local Algerian population and Synthetic line. Thirty rabbit does from each genetic type were used in this experiment. All does were first mated at 18 weeks of age and thereafter 10 days after parturition. The zootechnical performances of the females were measured during the first three parities. The weight of the females at mating was similar between two genetic groups of females (2861 *vs*. 2803 g; P <0.05). In contrary, the effect of the parity was highly significant on the weight of the females at mating. Indeed, the primiparous rabbit does presented lower weight than nulliparous (- 5 %; P<0.05) and multiparous (- 10 %; P<0.05). The weight of lactating females was significantly lower than non-lactating females (2772 *vs.* 2891 g; - 4%; P<0.05). The litter size at birth was significantly higher in the Synthetic line (+ 25%; P<0.01) and affected by the parity of the female. Indeed, the multiparous females has shown high litter size (+18%;P<0.05). The mortality at birth was significantly higher in the Synthetic line (10 *vs.* 1%;P<0.05). The season did not affect all the traits measured in this study.

Keywords: *rabbit, Local Population, Synthetic line, litter size, characterization.*

THE RELATIONSHIP OF ANOGENITALE DISTANCE AND SEMEN CHARACTERISTICS IN RABBIT SYNTHETIC STRAIN

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Abstract

This study has been carried out to investigate the relation between the anogenital distance AGD, behavior and semen characteristics using CASA system. A total of synthetic rabbits (n = 11), 6 - 7 months old and weight ranging from 2.965 to 3.585 Kg were tested. Observations on animals initially focused on the measurement of AGD and territorial marking. Subsequently, the males underwent training for ejaculation in the artificial vagina and finally the harvesting of the semen was carried out for macroscopic and microscopic analysis using CASA system. The mean AGD in the bucks used in our experiments was 15.73 ± 2.14 mm. Number of 55.55% of the males had an AGD greater than the mean AGD (15.73 ± 2.14 mm), whereas 44.44% had an AGD lower than the mean AGD (15.73 ± 2.14 mm). Bucks with large AGD ejaculate faster compared to males with a small AGD (9.81 *vs* 11.50 (s)) and there is a negative relationship between the AGD and the libido (AGD: 17,23 *vs* 13,84 ; libido (9,80 *vs* 11,50).The results of semen analysis of 51 ejaculates showed that the first ejaculates of each sample have a larger volume than the second ejaculates. The pH values oscillate between 7.4 and 8.5. The viability rate remains slightly higher for low AGD compared to high AGD (61% *vs* 63%).The concentration of spermatozoa in the first ejaculate of each sample is stable (between 140x106 and 150x106 spermatozoa per ml). However, it is variable in the second ejaculate of each sample (between 80x106 and 200x106 spermatozoa per ml).Rabbit bucks with small AGD showed greater sperm motility compared to those with a high AGD(VCL: 36 *vs* 45 µm / s), (VSL: 21 *vs* 25 µm / s) and (VAP: 27 *vs* 33 µm / s). However, color analysis of motility and its derivatives (VCL, VSL, VAP, LIN, STR, WOB, ALH,) and the percentage of live sperm and concentration shows that the spermatozoa have the same efficiency in the first and the second ejaculate of the same sample.It can be concluded that the AGD does not influence the quality of the semen.

Keywords: *Rabbit, AGD, Semen, CASA , behavior.*

RELATIONSHIP OF ANOGENITAL DISTANCE ON SEXUAL SATIETY AND TESTOSTERONE ASSAY IN RABBIT SYNTHETIC STRAIN

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Abstract

The objective of this study is to evaluate the effect of AGD on certain reproductive parameters such as scent marking, sexual satiety, haematological and (n = 20: 11 bucks and 9 primiparous females) aged 6 and 7 months and weights ranging from 3.150 to 4.250 Kg were studied in order to observe the effect of the anogenital distance (AGD) on chin marking behavior,sexual satiety (sexual behavior towards the female after 2h). Subsequently, the bucks underwent a blood sampling in the marginal vein, for the purpose of plasma analysis of testosterone and lipids (cholesterol and triglyceride).The results of this study indicated a mean measured AGD of 22.98 ± 1.98 mm. The number of 54.55% of the males had an AGD higher than the mean AGD, whereas 45.45% had a lower AGD.The AGD, on the other hand, has influenced at least some parameters of reproduction, chin marking, overlaps, shyness, protrusion, urination and testosterone levels and lipid balance.Our results indicate that the level of plasma testosterone has a very important effect during satiety of males. Males with a number of protrusions (4 to 13) had a very high plasma testosterone level (9.75-13.5) (ng / ml), whereas the males having a smaller number of protrusions (1 to 3) had lower plasma testosterone level (2.57-5.80) (ng / ml).Our results indicated that there was a very significant difference in the variation of the male scent marking according to their sexual satiety. There was a highly significant decrease in MM (72.74%; p = 0.007) after satiety (51*vs* 14).Our results indicate that males with high AGD have elevated testosterone levels (≥13.5-9.75ng / mL) and are those who score more in their territory compared to males with small AGD who have low testosterone levels between 11.33 - 2.75ng / ml. The difference between the two mean cholesterol levels during satiety is not significant (-3.90%, p = 0.86), and the difference between the two mean triglyceride levels during satiety is not significant (-1.79%; p = 0.947).In conclusion,the present work shows that the AGD affects at least the overlaps, shyness, protrusion, and chin marking which also serve as a parameter that helps our breeders to select breeding rabbits.

Keywords: *Rabbit, AGD, chin marking, sexual satiety, testosterone, glycerides, cholesterol.*

RESEARCH OF ANTIBIOTIC RESIDUES IN BREEDING RAW MILK BY THE DELVOTEST SP AND TWINSENSOR BT (BLIDA, ALGERIA)

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Abstract

Veterinary treatments, mainly antibiotics, used for therapeutic or prophylactic purposes in dairy cows, may be responsible for the presence of antibiotic residues in milk. These residues may represent an allergic, toxic or microbial danger to the consumer as well as heavy losses to the dairy processing industry. It is necessary to detect the antibiotic residues in the milk in order to ensure an irreproachable quality so that the milk intended for human consumption must be free from any kind of contamination. As part of the control of antibiotic residues, all stakeholders in the milk sector are concerned and involved. Thanks to their action, the risk of the presence of residues at levels higher than the authorized standards is now recognized in milk and all dairy products. In this context, we have evaluated the contamination of the raw milk, coming from the breeding farms of the wilaya of Blida and destined for dairy processing, by the antibiotic residues using Delvotest SP, a broad spectrum microbiological selection test, followed by Beta-lactamins and Tetracyclines by TwinSensor BT, an immunological test for rapid detection. The analysis of the 90 milk samples using Delvotest SP revealed 11 contaminated milks represented by a rate of 12.22%. The analysis of the 11 contaminated samples by TwinSensor BT showed a positivity rate of 27.28% and 18.19% for Beta-lactams and Tetracyclines respectively. This is a sign of misbehavior of some breeding farms, on the one hand, and the lack of legislative rigor on the other hand, systematically affecting the quality of milk presented for consumption. A search for antibiotic residues would have a safe value unless its application becomes systematic on all breeding in order to be able to exclude the positive milks of the circuit.

Keywords: *Raw milk, antibiotic residues, TwinSensor BT, Delvotest SP, Algeria.*

RABBIT BREEDING IN SOME EASTERN ALGERIAN REGIONS

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Abstract

In order to know the situation of rabbit breeding in Algeria, a survey was carried out in 80 rabbit farms (accounting for a total of 4900 breeding does) from 3 territories: M'sila, Sétif, Batna (73, 55 and 42 does on average, respectively). The results showed that the breeding was mostly managed by the family members (45.4% of farms). The percentage of 36.25% of the breeders had a university level. Just over half of the rabbit farms (53%) were recent (< 5 years). In 67.5% of the breeding units, rabbits were housed in old premises and only 32.5% of the breeders designed specific housing for their livestock. The percentage of 27.5% of the farms were small traditional units ≤ 20 does (11 on average), in 53.75% of the farms, the number of the does was between 20 and 80 (49 on average). Only 13.75 % of the breeding had more than 100 does (198 on average). Rabbits' food was manly composed by commercial pelleted, supplemented with dry fodder (6.25 % of farms) or quite exclusively by commercial pellets (16.25% of farms). Spontaneous herbs, dry bread, vegetable peelings and kitchen waste were also used in 7.5 % of the studied farms. The litter size at birth was between 6 and 9 rabbits (50% of farms). The young rabbits were generally weaned between 30 and 35 days (78.75 % of farms). Slaughter of rabbits took place between 3 and 4 months of age (in 55% of farms), at a weight of 2.5 to 3 kg (in 70% of farms).

Key words*: Rabbit, farm, breeding, Algerian.*

MICROBIOLOGICAL CHARACTERISTICS OF UNPASTEURIZED MILK COLLECTED IN FARMS, TANKS AND COLLECTORS IN THE CENTER EAST OF ALGERIA

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Abstract

The aim of this work was to estimate the quality of the unpasteurized milk collected in the Center East of Algeria (Boumerdes, Bouira and M'sila). In total, 80 samples of milk were taken in farms, tanks and collectors.The bacteriological analysis has shown a significant and higher presence of bacteria, especially, the faecal streptococci respectively 2.77 ± 2.64 Log10 UFC/ml which represented 15.88 %, 1.88±1.69 Log10 UFC / ml corresponding to 5.88% and of 3.12 ± 2.42 Log 10 UFC / ml corresponding to 18.90 % of the global contamination in Boumerdes, Bouira and M'sila. However, the contamination with staphylococci was 2.80 ± 2.71 Log10 UFC / ml corresponding to 18.82 %, 2.50 ±1.88 Log10 UFC / ml corresponding to 35.29% and 2.40 ± 2.58 (Log 10 UFC / ml) corresponding to 14.54 % of the global contamination respectively in Boumerdes, Bouira and M'sila and exceeding the national standards in Algeria. These results showed clearly the food danger which represents the consumption of the unpasteurized milk in these regions of Algeria, which is commercialized without any preliminary treatment and consumed sometimes fermented or acidified. In conclusion, this study shows the necessity of setting up a rigorous follow-up based on good hygienic practice and HACCP going from the farm to the dairy farm to ensure a better bacteriological quality of the collected milk and to avoid food risks to the consumers.

Keywords: *unpasteurized milk, bacteriology, global contamination, food risks, HACCP.*

COMPARATIVE STUDY OF CONVENTIONAL AND ALTERNATIVE TREATMENT OF STAPHYLOCOCCAL MASTITIS IN EWES

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Abstract

The treatment of mastitis by antibiotics has plenty of inconveniences, such as the emergence of antibioresistant bacterial strains. The aim of this work is to assess the possibility to use the association of honey and starch *in vivo* as an effective antibacterial treatment of clinical mastitis and to establish a comparison of the effectiveness of this alternative treatment with a classic conventional treatment in the therapy of clinical mastitis. We induced mastitis with *Staphylococcus aureus* in 8 lactating ewes of Rumbi breed free from all mastitis. Ewes were then treated, one teat with a conventional treatment (Amoxicillin/clavulanic acid) and the other one with an alternative treatment (honey/starch). Seven ewes showed an acute mastitis and one ewe showed hyperacute mastitis and sunk in shock, so it was ruled out of the experiment. Both treatments give satisfactory results, but the antibiotic got slightly the upper hand. Indeed, assessment of the effectiveness of the two treatments showed a healing rate of 100 % of teats treated with conventional treatment and a healing rate of 86 % of teats treated by alternative treatment. However, clinical and zootechnic improvement of teats treated by the alternative treatment was more satisfactory and faster than teats treated with the antibiotic. The conventional formula outweighs the alternative one, but since the first has many impacts on human health and the second has virtually no, this latter could be an interesting alternative therapy to antibiotics for the treatment of clinical mastitis in sheep.

Keywords: *Mastitis, Ewe, Staphylococcus aureus, Antibiotic, Alternative treatment*.

INVESTIGATION ON RODENTS' PRESENCE AND APPLICATION OF HYGIENIC MEASURES ON ALGERIAN POULTRY FARMS

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Abstract

Different species of wild rodents represent biological reservoirs of several diseases with various etiologies: bacteria; viruses and parasites. The major of these agents are zoonoses and could pose a threat for human health. Their presence at poultry farms is a real hazard to animal health and represents a stress factor that highly influences production performances. Facing this scourge, the control of their presence becomes a necessity. In order to provide information on the presence of rodents in poultry farms and hygienic measures applied by farmers, a study was conducted at the end of 2015, at 87 broiler farms in the central region of Algeria through surveys conducted face to face with farmers. The results show that rodents are a real problem in broiler farms, since their presence was reported in 87% of the investigated farms, with a permanent presence in 65% of the cases. The most encountered species are the gray rat (*Rattus norvegicus*) and the house mouse (*Mus musculus*). However, prevention programs against rodents lack in 30% of the surveyed farms and intervention of hygiene professionals does not exceed 7%. The farmers who participated in this survey do not take into account different risks associated with the presence of rodents. For this reason, health sensible recommendations are likely to reduce these hazards. Several elements could be taken into consideration; the most important are the organization of outreach and awareness days, as well as the establishment of adequate prophylaxis plans.

Key words: *rodents, poultry, zoonosis, hygienic measures.*

CHARACTERIZATION OF FATTY ACIDS IN COW'S MAMMARY SECRETIONS FROM DAIRY HERDS OF BLIDA PROVINCE

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Abstract

The present study is a contribution to evaluate the composition of fatty acids in the fat content of cows' mammary secretions (colostrum and milk). The results allowed to GC-MS 21 fatty acids methyl esters, including 9 short-chain fatty acids (< 16 carbon atoms), 2 medium-chain fatty acids (16) and 10 long-chain fatty acids (> 16), and on the other hand to identify by GC-FID 17 fatty acids methyl esters, including 8 short-chain fatty acids, 2 medium-chain fatty acids and 7 long-chain fatty acids. In the colostrum, the semi-quantitative analysis revealed that medium-chain fatty acid contents were higher than those found in long-chains (37.4% *vs* 35.57%), followed in this order by the short-chain fatty acids (20.19%). In milk, a reversed order appears for long- and medium-chain fatty acids (45% *vs* 26.64%). The richness of long-chain fatty acids (stearic and oleic acids) in milk could be explained by the nature of dietary concentrate (soybean meal) distributed by the stockbreeder which would decrease the short- and medium-chain fatty acids proportions for the benefit of the long-chain ones. The high level of certain insaturated fatty acids can be induced the problems of oxidation of milk products and certain fatty acids, as soon as conjugated linoleic acid seem play the benefits effects on human health.

Key words: *colostrum, milk, fat content, fatty acid, lactation, dietary.*

EFFECT OF SOME EXOGENOUS ENZYMES ON ANIMAL PERFORMANCE OF BROILER IN ALGERIA

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Abstract

The aim of this study is to evaluate various zootechnical and biochemical parameters at a poultry farm following the use of dietary exogenous enzymes. This study was conducted on a total of 7,400 chicks from Arbor Acres strain. They were divided into two groups, one received a basic diet (standard) not supplemented with enzymes as control throughout the rearing period and the other a diet supplemented with enzymes. Growth performance, feed efficiency and mortality were recorded at the end of each week. From our results, it was observed that the addition of the enzymes does not significantly improve body weight of feed conversion ratio during the breeding period. However, the mortality rate was higher in the control group compared to that supplemented with the enzymes. The diet based on exogenous enzymes decreased the level of serum glucose (2.16± 0.07 vs 2.60±0.18$^{)}$, respectively for the control and experimental group). It increased not significantly, the levels of triglycerides (0,87±0.18 vs 0,53± 0.06), HDL (0,79±0.14 vs 0,75±0.06), LDL (0,28±0.10 vs 0,16±0.05). Exogenous enzymes proved a positive effect on zootechnical parameters and serum glucose in Algerian broiler chicks.

Keywords: *Broiler, Enzymes, Performances, biochemical parameters.*

IMPACT OF A PLANT EXTRACT ''ORIGANUM MAJORANA'' ON THE ZOOTECHNICAL PARAMETERS AND THE STATE OF HEALTH OF BROILER IN ALGERIA

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Abstract

In the search for alternatives to antibiotics, several non-therapeutic extracts of plants, are increasingly being proposed and studied for increasing performance and control of Coccidiosis of chickens. The aim of this study was to evaluate the efficacy of plant extract supplementation for Origanummajorana to improve zootechnical performance and control broiler chicken coccidiosis. For 54 days, an experimental group A (1200 chicks) receiving water supplemented with an anticoccidial based on plant extract (OREGO-STIM, 150 ml per 1000 L) was compared with a control group C (1200 chicks) receiving in the drinking water a chemical anticoccidial,aswell as a group B (1200 chicks) receiving the two anticoccidians in the drinking water. Zootechnics performance results showed a difference in weight in favor of lot A (lot: A 3182 g, lot B: 2610 g, lot C: 3050) at the end of the breeding period. Consumption indices were similar. Subsequently, lot A showed a significant difference compared to lots B and C. The cumulative mortality rate recorded at the end of the rearing period was similar (5-6%) inthe three lots. The lesion scores obtained in the animals of group B at autopsy showed more important signs than those of group A and C revealing clinical and subclinical forms of coccidiosis. Under the present experimental conditions, the addition of an extract of Origanummajorana in drinking water improved the zootechnical performance of chickens. Nevertheless, the impact of this supplementation requires further studies to confirm or Control of coccidiosis.

Keywords: *Coccidiosis, Eimeria, Origanum, Chicken, Zootechnical performances.*

DETERMINATION OF COLLAGEN CONTENT IN ALGERIAN CAMEL MEAT

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Abstract

Collagen is an important constituent when the physical properties of meat are considered. In view of the fact that factors affecting camel meat toughness are not fully understood and the possibility that they could influence marketing of camel meat. A total of twenty-three camels (age range: 4 months-15 years) from both sexes and belonging to Sahraoui and Targui breeds were slaughtered following the normal abattoir procedures in Ouargla (Algeria). Samples of *Longissimus dorsi* were collected and the collagen content was determined. Mean value was 2.20±0.27 % on fresh material.Higher collagen content was recorded in animals more than 8 years old when comparedtoanimals from 0 to 4years old (p=0.024). The difference between the breeds was not significant (2.13 *vs*2.39% in Sahraoui and Targui breeds, respectively). Meat from the femaleshad significantly higher values than that of the males (4.77 *vs*1.82%).

Key words: *camel, collagen, sex, age, breed.*

EFFECT OF A MIXTURE OF VEGETABLE EXTRACT ON THE YIELD OF BROILER CHICKENS IN ALGERIA

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Abstract

In the context of the search for alternatives to antibiotics, several non-therapeutic substitution methodscanbevisage,including the use of plant extracts, which are increasingly being proposed and studiedwith the aim of improving the homogeneity and performance of breeding. This study took place during a period from October 15 to December 4, 2016. It was conducted in a traditional breeding . The objective of this study was to evaluate the efficacy of natural plant extractsupplementation (It is a natural product by distillation of the following natural plants (turmeric, olive leaf, grapefruit seeds, thyme, Rosemary). This product is in liquid form) to improve zootechnical performance and the healthstatus of broilerchicken for 50 days: an experimental batch (1200 chicks) receiving a vegetable extract (volarom) in the added water wascompared with a control batch 'A' (3000 chicks). Results on zootechnical performance showed a difference in weight and mortalitybetween the two batches. In numerical terms, there is a better body weight for batch D compared to batch A, taking into account what confirms the advantage of our product as a growth promoter. Under experimental conditions, the addition of a natural plant extract to drinking water showedsignificant performances, namelyzootechnical performance and an improvement in the state of health of broilerchickens.

Key words: *broilerchicken, homogeneity, zootechnical performance.*

HISTOLOGY STUDES OF THE OVARIES OF DUBSKA PRAMENKA DURING GRAVIDITY

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Abstract

In the histological analysis of the ovaries of Dubska pramenka during the gravidity weeks 3, 7, and 16, we tried to establish the intensity of folliculogenesis and highlight their importance in the course of gravidity. Considering that there has been little research on the ovaries of Dubska pramenka during gravidity, and that their unquestionable role in neuroendocrine system has a significant influence on the outcome of gravidity, we analysed the germ-germinal epithelium during different periods of gravidity, and we focused special attention to the representation of various follicular development stages in the cortex of gravid ovaries and blood supply of the medulla. The analyses showed that histology of the ovaries of Dubska pramenka varied considerably, especially in terms of the height of the cells constituting the germ-germinal epithelium, the presence of different forms of the follicles that exist at different stages of gravidity, while the blood supply of the medulla and the presence of connective tissue elements also varied, especially the morph of the connective tissues and their density.

Key words: *Dubska pramenka, gravidity, ovaries.*

EFFECTS OF NANO-SILVER SPRAY ON EGGSHELL MICROBES, HATCHABILITY AND CHICK QUALITY OF QUAIL EGGS

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Abstract

Improving sanitation of hatching egg is an important area of research, because of the key role of sanitation in hygiene program in poultry industry. Nano-silver has new physical and chemical characteristics enablinga strong antibacterial activity. This study was conducted to evaluate the influence of spraying nano-silver on the eggshell bacteria load, hatchability and chick quality in quail. Nano-silver was synthesized by using the chemical reduction of silver ions method and characterized (UV, concentration and TEM). A total of 1880 quail eggs obtained from the same flock,16 weeks of age, were randomly allotted to 4 groups, one control group (sprayed with TH_4) and three treated groups sprayed with 30, 40 and 50 ppm of nano-silver solution. Thirty minutes after spraying, eggs were sampled for total bacteria count determination. Eggs were randomly allocated in the incubator andreceived the recommended incubation conditions. At hatching day, hatchability and chick quality were determined. Results showed that eggs treated 50 ppm nano-silver had the lowest bacterial count on the eggshell. Hatchability percentage of nano-silver treated groups was similar. However, hatchability percentage of nano-silver 50 group was higher compared to control group ($P<0.05$). Chick weight, chick length and number of grade (A) chicks of all nano-silver treated groups were numerically greater compared to control ones ($P = 0.07$ 0.94 and 0.8), respectively. In conclusion, using nano-silver (30, 40 and 50 ppm) in the sanitation of hatching eggs can effectively reduce bacteria count on eggshell and improve hatchability and chick quality.

Key words: *Nano-silver, hatching eggs, sanitation, hygiene, antibacterial.*

THE EFFECT OF ZINC SOURCE AND METHOD OF ADMINISTRATION ON PERFORMANCE OF GROWING LAMBS

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Abstract

This study was carried to determine the effect of zinc source either from organic or inorganic as well as method of administration on animal performance, blood metabolites and carcass characteristics. Twenty lamb (about six month old and an average body weight of 26.5± 3.1 kg) ere divided into four similar groups (5 lambs each). Control group (G1) was fed basal diet consisting of 40% wheat straw and 60% concentrate mixture. While the three tested groups were fed the same basal diet, supplemented with 20 mg Zn//head/day as Zinc Methionine (G2), 20 mg Zn//head/day as Zinc Sulphate (G3) and 20 mg Zn/head/day as Zinc methionine (G4) by drench. Treatment of Zn in G2 and G3 was added to the diets. Animals were fed according to NRC (1985). The results indicated that the average daily gain (ADG) was significantly higher ($p < 0.05$) in zinc sulphate and zinc methionine groups than in zinc methionine drench and control groups (130 and 132 gm/day vs. 100 and 99 gm/day respectively). There was no significant difference in total feed intake. Feed conversion ratio as dry matter was improved in zinc methionine and zinc sulphate groups by 25.3 % and 26.8 %, respectively; however, the differences between groups were not significant. Supplementation of Zn-meth and Zn-meth drench significantly ($P<0.05$) increased the level of zinc in serum as compared with control and zinc sulphate groups. Also, serum cholesterol was significantly higher ($p < 0.05$) in treated groups than in control group. While, serum total protein, Albumin, globulin, glucose, triglycerides and total antioxidant capacity (TAC), were not affected by zinc supplementation. The treatment also had no effect on dressing percentage and carcass cuts in lambs. Our study revealed that zinc supplementation in any form had positive effect on animal performance and preference of dietary method rather than drenching.

Keywords: *growing lambs, Zn-methionine, Zn sulphate, performance, blood metabolites, carcass cuts.*

EFFECT OF *HUMULUS IUPULUS* ESSENTIAL OIL ON PERFORMANCE, MEAT QUALITY AND INTESTINAL MICROBIOLOGY OF BROILERS

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Abstract

This study was conducted in July-Ague 2014 on animal science research institute farm to evaluate the effect of different levels of *Humulus lupulus* essential oil (HIO) as an antibiotics replacement, on the performance, meat quality and microflora population of broiler ileum chickens. Inthis experiment, 625one-day-old Arian broiler chicks were used in a completely randomized design with five treatments (200(1), 400(2)mg/kg HIO, Control (3), probiotic(4), antibiotic(5)) and five replication. Result showed that weight gain, feed conversion ratio (FCR) and mortality rate of broilers had no significant difference between treatments ($P>0.01$). In total experimental period, in comparison with other treatments,no. 4 and 5 treatments had the highest feed intake, 81.53gr/bird/day vs 83.08, respectively ($p<0.001$). The highest lactobacillus count and the lowest Escherichia coli count of the ileum were observed by inclusion of 400 mg/kg HIO, in ration ($p<0.001$). The carcass analyses result showed no significant difference. Also the use of HIO caused a significant reduction of Malon-Di-Aldehyde (MDA) in femur meat ($p<0.001$). Water holding capacity of meat breast in HIO treatments (no 1 and2) was better than in other treatments, although this difference was not significant($P>0.01$).Finally, inclusion of 200mg/kg HIO recommended as an optimum level and, as an antibiotic replacement in rearing period of broilers.

Keywords: *Antibiotic, Humulus Lupulus, Performance, meat Quality, Broilers.*

EFFECT OF DIFFERENT LEVELS OF UREA AND MOLASSES ON SILAGE CHARACTERISTICS OF SUGER BEET TOP MIXED WITH SUGAR CANE BAGASSE

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Abstract

This experiment was conducted in Oct-Jan 2014 on Khoozestan province to evaluate the effect of dry matter contents, urea and molasses level on silage characteristics of mixture of sugar beet top (SBT) and sugar cane Bagasse (SCB). A completely randomized design with factorial arrangement was conducted to evaluate the effect of three levels of dry matter (25, 35 and 45 percent) three levels of urea (0, 1 and 2 percent) and three levels of molasses (0, 5 and 10 percent) on silage characteristics of sugar beet tops (including leaves and crown) and sugar cane bagasse. The silages were prepared in experimental scale. After two months of ensiling, the silos were opened and evaluated for dry matter, pH, color, smell and physical texture. Results showed that the increasing of dry matter content from 25 to 35 percent improved the indices of color and smell score. The pH value was decreased by increasing the level of molasses in silages, where opposite trend was observed by increasing the level of urea. It is concluded that addition of one percent urea and 10 percent molasses to the mixed SBT and SCB with 35 percent DM could result in good silage.

Key words: *Sugar beet tops, sugar cane Bagasse, silage.*

EFFECT OF BARLEY GREEN FODDER GROWN IN A HAYDROPONIC SYSTEM IN THE DIET OF LACTATING DAIRY COWS

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Abstract

This research was planned to evaluate the effects of feeding rations containing different levels of barley green fodder (HBGF), grown in a hydroponic system, on the performance of lactating cows. In a 4×4 change over design, eight multiparous Holstein cows weighing 615±56.07 kg with daily milk yield of 31.15±2.75 kg and 83±12 d in milk were assigned to four treatments. Each change over period consisted of 21 d in length, with a 14-d adaptation, followed by 7-d of data collection. The diets consisted of 62% concentrate, 20% alfalfa hay and 18% maize silage on DM basis, where the silage portion was substituted by HBGF in amount of 0.00, 20, 40 and 60% in diets I, II, III and IV respectively. The average dry matter intake was 23.20, 22.98, 22.67 and 22.65 kg/d, reduced ($p<0.05$) by increasing HBGF in the diet. Feed efficiency, based on the amount of milk yield per kg of DM intake, was 1.25, 1.28, 1.27 and 1.31 and statistically it was not affected by the treatments. The inclusion of HBGF to the diet did not statistically affect the milk yield (27.38, 27.62, 26.41 and 27.22 kg/cow per d), 4FCM (24.10, 24.31, 23.24 and 23.96 kg/cow per d), fat yield (828, 835, 778 and 803 g/cow per d), protein (932, 835, 892 and 922 g/cow per d), and total daily dry matter (3110, 3080, 3060 and 3020 g/cow per d) yield. In conclusion, utilization of HBGF in the diet did not affect the performance of the lactating cows, when compared with maize silage, but it had a limitating effect on feed intake. Additionally, the biological efficiency of barley in hydroponic green fodder may be reduced in comparison to the barley grains in dairy cows' diet that increase the cost of feed and feeding, resulting in a negative economic balance.

Key words: *Barley, Green fodder, Hydroponic, Dairy cows.*

EFFECT OF THIAMINE NUTRITION ON QUEEN EGG LAYING, BROOD REARING AND ADULT POPULATION OF IRANIAN HONEY BEE COLONIES (*APIS MELLIFERA* MEDA) IN SPRING SEASON

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Abstract

Honey bees need a range of elements to satisfy their nutritional requirements for normal growth and development. These elements include proteins (amino acids), carbohydrates (sugars), fats (fatty acids), minerals, vitamins and water. It is little known about the vitamin requirements of honey bees. An experiment to investigate the effect of thiamine nutrition on honey bee colony growth was carried out in the spring. Twenty honey bee colonies, divided into 5 experimental groups, were used in this study. Control groups were fed with sugar syrup (1:1). The experimental colonies were fed in the same manner but with syrup supplemented with different levels of thiamine (100, 200, 300 and 400 ppm). Nutrition was conducted for 30 days in the spring. Measurement of queen egg laying, brood rearing and the adult population, respectively 10, 20 and 30 days after the nutrition was done. Egg and brood areas were measured in all the experimental colonies with using a grid with 5×5 cm squares that covered the entire side of a comb. The adult population was measured in the frame. No significant differences were found between treatments on queen egg laying, brood rearing area and adult population size in spring, which could be due to the abundance of pollen and nectar in this time.

Keywords: *Nutrition, Thiamine, Honey bee, Season.*

PEAS AND NON-STARCH POLYSACCHARIDES-DEGRADING ENZYMES INFLUENCE ON LAYING HEN'S EGGS SENSORY QUALITY

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Abstract

Peas can be used in the diets of all classes of poultry. Besides that, peas could be more widely used in poultry nutrition while given the pressure on natural resources, agriculture has to improve its environmental performance through more sustainable production methods. As changes in layer's diet can change typical flavour or texture properties of eggs it is very important to analize possibility that non-typical odour or taste will appear in fresh or stored eggs. A feeding trial with 60 laying hens was performed – laying hens were divided into 6 groups – they were fed a full-rate feed with peas and non-starch polysaccharides-degrading enzymes – volume of added peas included three levels (0 %, 15%, 20%) and the inclusion of enzymes had two levels (with and without). The samples of eggs for sensory analysis were fresh. A sensory panel for the quantitative descriptive analysis consisted of 5 - 6 assessors experienced in evaluation of eggs sensory quality. A structured numerical scale was used for evaluation of the intensity of each attribute. A data collection system for automatic acquisition of the assessor scores and data analysis was used (FIZZ, Biosystems, France). Intensity of egg yolk and albumen sensory attributes, such as overall odour, non-typical odour, hardness, taste of yolk and albumen, non-typical taste, yolk color intensity, granularity of yolk were determined. In current research it was determined that applied diet did not have effect on the sensory properties of the fresh eggs. Selected doses of used supplements did not alter albumen and yolk taste, odour and texture attributes.

Keywords: *Peas, laying hens, non-starch polysaccharides degrading enzymes, sensory quality.*

EFFECTS OF EXTRUDED FABA BEANS *(VICIA FABA)* ON DAIRY COW'S PERFORMANCE, MILK COMPOSITION AND SENSORY PROPERTIES

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Abstract

Grain legumes, such as soybean (*Glycine max (L.) Merr.*), pea (*Pisum sativum L.*), faba bean (*Vicia faba L.*), lupins (*Lupinus spp.*), common vetch (*Vicia sativa L.*) and grass pea (*Lathyrus sativus L.*), represent one of the most qualitative and least expensive solutions for a long-term demand for plant protein in animal husbandry. A number of research had been done in order to investigate legume grains effects on dairy cows performance and milk composition, but there have not been done any research in pursuance to investigate its effects on milk sensory profiles. So, the aim of our research was to determine the influence of extruded beans on dairy cow's performance, milk composition and sensory properties. Lithuanian Black-and-White cows with analogous characteristics were selected and randomly allocated into 2 groups (control and experimental), 10 animals each. The control group was fed a conventional diet enriched with extruded full fat soybean. The experimental groups were fed a similar diet, but instead of 1.5 kg of soybean meal, the cows were given the same amount of the extruded beans and 400 grams of extruded soybean. The results of this study shown that a part of extruded soybeans replacement with extruded beans in dairy cows rations, had negative effect on milk yield, during all experimental period experimental group's cows fed with extruded beans and soybean protein supplement, the amount of fat-correlated milk was 226.5 kg or 9.4 %. less comparing to control group ($P>0.05$). During experimental period, the amount of protein, fat, urea and lactose in milk, both in control and experimental group, did not differ significantly. The results of milk sensory properties analysis shown that a part of extruded soybeans replacement with extruded beans in dairy cows rations had no negative influence on milk sensory parameters.

Keywords: *dairy cows, extrusion, beans, milk yield, milk composition.*

EFFECT OF MEDIUM CHAIN FATTY ACIDS AND JERUSALEM ARTICHOKE TUBER'S FLOUR ON LAYING HEN'S PRODUCTIVITY

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Abstract

The effect of antimicrobial activity of medium chain fatty acids (MCFA) is observed to reduced number of intestinal infections, improves intestinal morphology and due to the prebiotic effect of Jerusalem artichoke better results were get in digestive and absorptive capacities; it can lead to better egg productivity in laying hens. The aim of this study was to evaluate Jerusalem artichokes (Helianthus tuberosus L.) and MCFA addition into hen's diet influences on eggs production and egg quality parameters. Feeding trial was conducted with laying hens of *Lohman Brownn* strain at the age of 38 weeks. Hens were divided into four groups; each group contained 10 laying hens. Control group was fed with standard compound feed and experimental groups diets were supplemented with 0.1 %. MCFA (I group), 2 %. Jerusalem artichokes tuber's flour (II group) and 0.1 % MCFA + 2 % Jerusalem artichokes tuber's flour (III group). Jerusalem artichoke flour and MCFA addition in to hen's diet did not influence feed intake and laying intensity, but egg mass was 1.64 % higher in I group and 3.18 % in III group ($P<0.05$) compared to the control group. During the experimental period 2 % Jarusalem artichoke tuber's flour and 0.1 % MCFA had significant effects on albumin pH, yolk colour and strenght of eggshell (kg/cm^2). We concluded that laying hen's diet supplemented with 0.1 % MCFA and 0.1 % MCFA+ 2 % of Jerusalem artichoke tuber flour had positive effect on laying hen's egg mass and egg quality parameters.

Keywords: *Laying hen's, medium chain fatty acids, Jerusalem artichoke.*

APPLICATION OF GENOMIC SELECTION IN DAIRY CATTLE IN LITHUANIA

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Abstract

The use of genomic information in genetic evaluation has brought about revolutionary change in dairy cattle selection. In a pilot study 200 dairy cows in Lithuania were selected for dairy genomic profiling, including determination of genomic breeding values for traits, such as productive life, fertility, dairy form, somatic cell count (SCS), milk yield, fat amount, fat %, protein amount, protein %. DNA was extracted from blood by chloroform salt method. Genotyping was performed by Igenity SNP panel with multiple markers. Cattle for genomic breeding values were rated in Igenity cattle reference group. High genomic prediction breeding values, varying from 8 to 10 points, in productive life got 23% of tested cows, in milk yield 13%, in fat kg 25.5%, in fat percent 17%, in protein kg 27%, in protein percent 41.5%. Low genomic values varying from 1 to 3, which are desirable in SCS, have been found in 13% of tested animals. Middle genomic values, 5 or 6 points in all traits have been found in 35% of all tested cattle. Average genomic value of dairy cattle bred in Lithuania did not differ from reference group cattle, which reflects genomic values of animals kept in different environments. In Lithuania there are dairy cattle with high genomic prediction breeding values for separate traits, suitable for elite animal selection. Igenity SNP markers identify genetic variations that helps regulate milk yield, protein and fat content, without decreasing fertility. The combined results provide a more complete picture of production potential of animals.

Keywords: *Genomic selection, Genomic profile, Dairy cattle, Genomic breeding value.*

INFLUENCE OF ORGANIC AND INORGANIC IRON ON LAYING HENS PRODUCTIVITY AND BLOODS MORPHOLOGICAL COMPOSITION AND PARAMETERS IN BLOOD

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Abstract

In the past, poultry nutritionists were interested in establishing nutrient requirements of poultry to support maximum performance of laying hens. The aim of this study was to investigate the effects of diets supplemented with organic and inorganic iron in different amounts on the productivity and blood parameters of laying hens at 28-36 weeks of age. A total of 36 *Lohmann Brown* laying hens at 28 weeks of age were assigned to three treatment groups (12 hens per each treatment group) and fed experimental diets for 8 weeks. The diets comprised 70 mg FeSO4 (Control group I), 150 mg iron sulphate (Group II), 70 mg FeSO4+72 mg of iron glycinate (Group III) and birds were keeping in the same conditions. Organic and inorganic iron in different amounts did not have statistically significant effect on the productivity of the laying hens. When analyzed the data on laying hens' blood parameters, the results were statistically significant when it comes to the concentration of iron (in Group II it increased 29%, $P<0.05$) and concentration of ALAT (in Group III –it increased 36% $P<0.05$). Alkaline phosphatase, however, had a tendency to decrease in all experimental groups, from 1.45 to 6.71 times ($P<0.05$) compared to the control group. When analyzed the morphological composition of blood, statistically significant results were obtained in Group III on platelets; it decreased 25 % compared to the control group. To conclude, it could be said that different origin and amount of iron did not have any effect on laying hens' productivity, but had a positive effect on some blood parameters.

Key words: *Iron, laying hens' productivity, blood parameters.*

HIGH FAT DIET TRIGGERS INFLAMMATORY RESPONSE AND METABOLIC STRESS IN RAT MODEL

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Abstract

Diets have a great impact on health and health-related issues. High fat diet consumption is causally associated with the epidemic development of several metabolic disorders. The manifestation of these metabolic disorders has been linked to chronic diseases like Crohn's disease, ulcerative colitis (inflammatory bowel disease), insulin resistance, intestinal junction disruption and ultimately cancer. The mechanisms underlying are an association with cellular stress and development of metabolic disorder after a high fat diet. However, the exact mechanism behind high fat diet induced obesity is poorly understood. We hypothesized that high fat diet induced metabolic stress would synergize and mediate chronic inflammation leading towards inflammatory stress response which would impact insulin sensitivity and lipid metabolism. So this research was designed to investigate the effects of high fat diet on various physiological aspects, gut pathophysiology, epithelial signature and metabolic stress in a rat model. Metabolic stress conditions were assessed by structural, morphological changes in gut epithelium and serum lipid profile. Our results show a complex interplay of high fat diet as well as high fat diet induced stress on gut epithelium alterations, lipid metabolism, and plasma insulin level. Collectively, these results suggest that high fat diet as pervasive factors that can exacerbate inflammatory response by altering metabolism. The data were statistically analyzed by one-way ANOVA and DMR.

KeyWords: *Metabolic stress, inflammatory response, lipid metabolism, Pathophysiology.*

SILYMARIN EXCELLED ZINC OXIDE IN IMPROVING NUTRIENT RETENTION AND APPARENT METABOLISABLE ENERGY OF BROILERS AT DAY-21

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Abstract

Heat stress has remained a subject of interest since long in all different types of poultry operations. High ambient temperature during summer adversely affects the production and nutrient utilization by birds in various parts of Pakistan. A number of dietary and managemental strategies are opted to combat heat stress and ameliorate its bad impacts. Phytobiotics have gained considerable attention and could be effective in minimizing heat stress. In present study we assessed the impact of silymarin in comparison to high concentration of Zn in poultry diet in heat stressed broilers. Male ROSS-308 day-old broilers (n= 270) were divided in two groups; one (A) was exposed to high temperature (36 ^{0}C) and other (B) to normal housing temperature (30-28^{0}C). These groups were sub-divided into 3 replicated (n=3 15bird/replicate) groups (X; control diet, Y; 10g Silymarin/kg, Z; 60mg ZNO/kg diet). High house temperature significantly reduced nutrient retention (4-6%) and apparent metabolizable energy (3.5%) of diet by broilers. This partially recovered by increased level of Zn in diet, but not the extent of positive control. However this reduction was significantly increased by birds in groups supplemented with silymarin (Milk thestil).Birds that were exposed to high temperature had decreased production of white (4.6 x 10^3 mm) and red blood (2.1 x 10^6/FL) cells, hemoglobin (8.22 g/dl) and packed cell volume 938.1%). This condition was significantly altered by silymarin; however, it was only numerically improved by ZNO. These findings revealed that supplementation of silymarin could be strategically used to ameliorate the adverse effects of high summer temperature.

Keywords: *Milk Thistle, Zinc oxide, Broiler, Blood parameters, Heat stress.*

HIGH PROTEIN DIET AMELIORATES ALLOXAN-INDUCED DIABETES IN RAT MODEL THROUGH REGENERATION OF PANCREATIC β-CELLS

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Abstract

Diet is a key factor in promoting health, metabolic homeostasis and fulfilling energy requirements. Diabetes mellitus is a metabolic disorder and characterized by hyperglycemia resulting from defect in insulin production or secretion, insulin action or both. So, β-Cell dysfunction is a critical component in the development of diabetes. The amount, type and balance of the main dietary macronutrients (carbohydrates, proteins and fats) have a great impact on the management of diabetes. However, little is known about the molecular mechanism that how high protein diet is responsible for functional changes in pancreatic β-cells. This study was designed to investigate the effect of high protein diet on physical parameters, glycaemic control, β-cell regeneration, insulin production and release in diabetic rats. High protein diet was administered to alloxan induced diabetic rat model. Blood samples were taken for measuring blood glucose level, lipid profile and other biochemical tests. Tissue samples of pancreas and liver were collected for morphological study. Results indicated that high protein diet counteracted the reactive oxygen species (ROS) produced inside β-cellsand normalized the elevated serum glucose, triglycerides and cholesterol levels and helps in normalizing the pancreatic tissue structure, morphology as well as normal replenishing or regeneration of β-cells. The data was analyzed statistically through one way ANOVA and DMR.

Key Words: *high protein diet, alloxan induced diabetes, glycaemic control, β cell regeneration.*

GENOTYPING BY SEQUENCING FOR INCREASING MILK PRODUCTION THROUGH MOLECULAR SELECTION OF SUPERIOR BUFFALO BULLS

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Abstract

Low milk production in Pakistan is one of the major problems that local livestock facing along with lack of superior bulls for improvement in next generations. Bulls are preferred for increasing milk production as compared to dam, because it can only produce 5-6 offspring in its whole life span, while a bull can produce thousand doses of semen and by dilution these doses can be used to maintain continuity in generations. Milk production enhancement holds promise for the progress and prosperity of Pakistan. Bull selection is important as compared to dam selection due to its status of half herd. Genotyping by sequencing is a highly multiplexed system and a simple approach to construct libraries for next generation sequencing. It is expected that such selection would be more reliable and helps to promote the dairy industry. In this study, blood samples from physically healthy bulls were collected and used for the genomic DNA extraction followed by restriction digestion of the whole genome. Genotyping by sequencing was designed for efficient genotyping of a large number of samples using the next generation sequencing platform. Thus, the objective of the present study is to analyze the genome of selected superior buffalo bull further for improving milk production, health status and rural economy.

Key words: *Genotyping by sequencing, Milk production, Molecular selection, Next generation sequencing, Superior buffalo bulls*.

MINERAL CONCENTRATIONS IN THE PLASMA OF YOUNG FARMED FALLOW DEER (*DAMA DAMA*) IN RELATION TO THE FEEDING SYSTEM

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Abstract

Ruminant breeders, who strive to feed their animals properly, focus their attention on three components of diet: metabolic energy, total protein and raw fibre. Properly balanced nutrition should take into account another element, i.e. the proper level of mineral-vitamin compounds. The paper shows the effects of nutrition on the content of micro- and macro-elements in the blood of farmed fallow deer reared in two systems. Male calves constituted the main study group. All the animals had constant access to water and hay. One of the groups of the animals kept in a special rearing house received a complementary mineral feed mixture for calves "Cielak plus 2.5%" produced by LNB; the administration followed manufacturer's recommendations. Additionally, the feed contained fodder composed of 70% of crushed oats, 15% of the "universal rapeseed concentrate" (producer: Eko-pasz) containing 33% of crude protein, and 15% of the "universal soybean concentrate" (producer: Eko-pasz) with 45% of crude protein. The second group was reared in a free-range system outside the calf-shed and was fed roughage feeds ad libitum. The aim of this study was to determine the selected minerals in the plasma of young farmed fallow deer. The blood was collected at slaughter, which is a natural element in the farm rearing technology. Plasma P, Ca, Mg, Zn, Fe, and Cu levels were determined. Specific reference intervals are needed for each animal species for appropriate interpretation of haematological and serum biochemical results. Serum biochemical parameters, such as phosphorus, calcium, magnesium, zinc, copper and iron content, were determined using reagent kits (BioMaxima, Lublin, Poland), according to manufacturer's protocol and a random access biochemical analyser Metrolab 2300 GL (Metrolab SA, Buenos Aires, Argentine). The preliminary results confirm the beneficial effect of feeding young animals diets containing higher protein contents and mineral mixes.

Key words: *Dama dama, nutrition, micro- and macro-elements.*

THE APPLICABILITY OF SELECTED DIAGNOSTIC DEVICES FOR ENHANCING THE WELFARE OF FARMED FALLOW DEER DOES DURING THE REPRODUCTIVE PERIOD

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Abstract

In farmed fallow deer (*Dama dama*) behavioural changes associated with reproductive period are much more difficult to identify than in other domesticated animals. The aim of the study was to determine the applicability of selected devices and diagnostic and laboratory methods for oestrus and pregnancy detection in fallow deer does reared in farm conditions. The tested instruments were an electronic oestrus detector, a pregnancy detector and an ultrasound scanner. Blood progesterone levels were determined in the evaluated animals. Not all of the analysed methods of pregnancy detection were equally applicable in a fallow deer farm. The electronic oestrus detector was easy to use, however, animals had to be chased and captured for the tests, therefore, the device is not highly practical in commercial deer farms. The electronic pregnancy detector was the most useful tool for early detection of pregnancy in fallow deer. Its greatest advantages include considerable ease of use, instant results and relatively low cost. Ultrasonography was 100% effective in diagnosing late pregnancies. Pregnancy in fallow deer was most effectively confirmed by an ultrasound examination between day 50 and day 80 after fertilization when bones and cartilage were visible The determination of progesterone levels in blood samples also delivered highly reliable results, but blood tests have to be performed after the spring equinox.

Keywords: *Deer farming, Dama dama, welfare, diagnostic devices.*

EFFECTS OF DIETARY SUPLIMENTATION WITH OIL EXTRACT OF SEA-BUCKTHORN AND THYME ON GROWTH PERFORMANCE AND FEED UTILIZATION OF STERLET STURGEON (*ACIPENSER RUTHENUS)* LARVAE

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Abstract

Lately, there is a considerable interest in researching the possible use of natural products such as essential oils and herbal extracts for the development of new fish food recipes or to increase fish immunity and to prevent the occurrence of diseases. Knowing the beneficial properties of sea buckthorn and thyme oil, the objective of our study was to evaluate the growing performance of *Acipenser ruthenus* larvae after feeding with these extracts. The larvae were stocked into a recirculating aquaculture system (RAS) and acclimatized for two weeks. The individual average of biomass weight of starlet sturgeon larvae was 1.39 ± 0.06 g. The experimental variants were: V1 – Control, V2 – 1% Sea buckthorn (*Hippophae rhamnoides) /* kg feed, V3 – 1% Thyme (*Thymus vulgaris*) / kg feed and V4 – 1% Sea buckthorn and Thyme / kg feed. Each treatment was made in three replicates. Fish were fed with ADVANCE pelleted feed, from COPPENS, with granulation of 0.3 – 0.5 mm. The administered feed had a crude protein content of 56 % and a crude fat of 15 %. At the end of the experiment, the highest specific growth rate (SGR – % / day) and the best food conversion ratio (FCR – g / g), protein efficiency ratio (PER – g / g) and feed efficiency were obtained in variants in which the extract plants oil were added in diet and lowest in the control group. These results reveal that the introducing of these extracts into sterlet sturgeon larvae diets enhance growth, feed utilization and survival.

Keywords: *Sea buckthorn, Thyme, Sterlet larvae, Recirculating aquaculture system.*

Acknowledgements

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EFFECTS OF DIFFERENT FEEDING RATIOS ON THE GROWTH PERFORMANCE OF AQUACULTURE RUSSIAN STURGEON JUVENILE

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Abstract

The effects of different daily feeding rates on the specific growth rate and food conversion ratio of Russian sturgeon juveniles (*Acipenser gueldenstaedii*), reared in a recirculating aquaculture system, were investigated in order to determine the optimum daily feeding rate for fish. The rearing experiment was carried out in four variants, two replications, fish were divided into eight tanks, each tank was populated with 18 juvenile Russian sturgeons with an average body mass of around 248.194 ± 1.59 g. The fish were fed with commercial TroCo PRIME-18–extruded pellets with a protein content of 42% and a fat content of 18%. The experimental variants were: V1- 1.0% from body weight (BW), V2- 1.5% BW, V3- 2% BW and V4- ad libitum feeding. At the end of the experiment, specific growth rate (SGR) calculated in V1 variant was 0.68 % g day^{-1}, in V2 - 1.01 % g day^{-1}, V3 - 1.34 % g day^{-1} and V4 - 1.88 % g day^{-1} and the feed conversion ratio was for V1- 1.69, V2- 1.29, V3- 1.12 and V4- 1.01. The best body weight was obtained in the group V4 (527.86 g/ex) followed by V3 (425.17 g/ex), where was registered also the highest feeding ratio. Feeding ratio had a significant effect on the BW% and SGR. The results suggest an optimal feeding rate between 2% BW/day and ad libitum, but analyzing the obtained results from an economical point of view, because protein is the most expensive macronutrient in fish diet, we can conclude that the optimal ratio for Russian sturgeon juveniles (with a mean weight of 248.194 ± 1.59 g) is 2% BW.

Keywords: *Russian sturgeon, feeding ratio, recirculating aquaculture system*

Acknowledgements

This work was supported by a grant of the Romanian National Authority for Scientific Research and Innovation, CNCS/CCCDI – UEFISCDI, project number PN-III-P2-2.1-BG-2016-0417, within PNCDI III".

ATTITUDES OF FARMERS - MEAT PROCESSORS – CONSUMERS CHAIN ON PIG SURGICAL CASTRATION VERSUS ENTIRE MALE PRODUCTION OR IMUNOCASTRATION

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Abstract

The surgical castration of male pigs will be ended in Europe, by January 1st 2018 because this method without pain relief is considered unacceptable. The alternatives are the production of entire males or the imunocastration. The Romanian consumer is a pork meat eater and at the same time is conservatory and traditionalist in terms of meat and meat products quality. The study aims to evaluate the attitude of the market and the consumers and to harmonize this with meat processors, farmers and Government bodies tools for keeping the meat and meat products quality and consumers' acceptance. The survey was conducted face to face and on line with 300 consumers from urban and rural areas of Romania. The questionnaire used had 37 questions distributed in 4 groups. First group was to identify if and how often they consumed pork meat and if they understood the alternatives. The second group of questions was targeted on attitude *versus* sensorial quality. The third group analyzed the acceptability of meat from imunocastrate/entire male pigs. And fourth group of questions was for demographic data. The tasks for producers were connected to raw meat quality, meat products quality and boar taint in meat products. For the farmers, the survey was conducted on understanding the welfare and on their acceptance on using programmes on reducing boar taint, improved production system or to adopt a feeding strategy. The survey results were analyzed using MINITAB 17 software and would serve to develop information strategies.

Keywords: *Pigs, Entire male, Imunocastration, Consumer, Acceptance.*

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PERFORMANCE OF BROILER CHICKENS REARED ON REUSED LITTER

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Abstract

Poultry litter reuse is a common practice in some countries mainly due to production cost but this approach is not practiced in Saudi Arabia even with scarcity of bedding materials and large quantities of these materials are imported from abroad. Therefore the objective of this study was to investigate the effects of reused litter on broiler performance. A total of 900 day-old broiler chicks were randomly allocated to three treatment groups viz: reused nondisinfected litter (RL), reused disinfected litter (RDL) and new litter (NL; which also saved as control). Each treatment groups had five replicates and each replicate had 60 chicks. Weekly body weight (BW), weight gain (WG), feed intake (FI) and feed conversion ratio (FCR) were measured. Relative weights of gizzard, heart, liver and dressing percentage were calculated at day of slaughtering. The results of the study showed that there were no significant differences among the broilers raised on 3 litter types for the performance. This study provided evidence that chickens raised on used litter showed a similar performance to that chickens raised on a new litter and no negative effects on dressing percentage. The results indicated that broiler chickens could be reared successfully on reused litter either as disinfected or nondisinfected reused litter.

Keywords: *Broiler, Litter, Performance, Dressing percentage.*

HOUSING FACILITIES FOR DAIRY COWS ON THE TERRITORY OF THE MUNICIPALITY OF VRNJAČKA BANJA (SERBIA)

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Abstract

During the production cycle of dairy cows, all necessary conditions, with care and nutrition above all, must be provided. Housing must have good beds that are spacious and comfortable with a good and dry mat, a sufficient quantity of drinking water and adequate mangers. Ventilation, lighting, and humidity in the housing must comply with animal hygiene standards. In this sense, the objective of this paper was to obtain data i.e. parameters speaking of the condition of facilities and quality of dairy cows breeding in the municipality of Vrnjačka Banja and Kraljevo. The paper presents tabular data on the condition of facilities for housing dairy cows, construction characteristics of facilities, accommodation capacities, ventilation method, facilities lighting and relative humidity in facilities for animals. On the other hand, animal nutrition must meet both physiological and productive needs with enough proteins, carbohydrates, macro- and microelements and to vary by the physiological process and season. For this reason, during a visit, the authors gave farmers appropriate professional recommendations for feeding dairy cows according to the method of cultivation or depending on whether livestock breeding is of indoor type or combined with grazing.

Keywords: *housing facilities, cow nourishment, feeding dairy cows.*

CARBOHYDRATE FRACTIONS OF ENSILED PEA: OAT MIXTURES

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Abstract

The pea and oat were tested at five different mixture rates: A_1-100% pea + 0% oat; A_2-0% pea + 100% oat; A_3- 25% pea + 75% oat; A_4-50% pea + 50% oat and A_5- 75% pea + 25% oat. The pea:oat mixtures were ensiled without (B_1) and with bacterial inoculant (B_2). The objective of this experiment was to assess the effects of pea proportion and bacterial additives on carbohydrate fractions of ensiled pea:oat mixtures. Silage samples were assayed for DM (Dry Matter), CP (Crude Protein), CHO (Total Carbohydrates), NSC (Non-Structural Carbohydrates), Starch, NFC (Non-Fiber Carbohydates), aNDF (Neutral Detergent Fiber), ADF (Acid Detergent Fiber), HCL (Hemicellulose), Lignin and DMD (Dry Matter Digestibility) and carbohydrate fractions by CNCPS (Cornell Net Carbohydrates and Protein System). It was realized that pea and oat can be planted succesfully for herbage production, and these mixtures can be succesfully ensiled and obtained high quality silages. The addition of bacteria slightly decreased ($P< 0.05$) the CP and NSC contents of silages but increased ($P< 0.05$) the aNDF, ADF and DMD. Ensiled 100% pea had the highest CP and NFC content and the highest DMD. The pea: oat (75 : 25) silage had the lowest aNDF (560.3 g kg^{-1} DM), ADF (425.8 g kg^{-1} DM) and lignin (79.0 g kg^{-1} DM), but had the highest DMD (612.0 g kg^{-1} DM). CB_3 fraction of carbohydrates was the highest fraction in the pea: oat silage.

Keywords: *bacterial inoculant, pea:oat mixtures, silage, carbohydrate fractions.*

DETERMINATION OF BLOOD SERUM CALCIUM, INORGANIC PHOSHORUS AND MAGNESIUM IN DIFFERENT PRODUCTIVE STAGES OF HOLSTEIN DAIRY COWS

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Abstract

The aim of this study was to determine and compare levels of blood serum calcium, inorganic phosphorus and magnesium in peripartal period and during the mid of lactation in Holstein dairy cattle. Blood samples were collected from 12 late pregnant cows, 12 early lactation cows and 12 mid lactation cows. Serum calcium and inorganic phosphorus in blood of dairy cows in early and mid lactation were significantly lower ($p<0.05$) compared to the values in the blood serum of dairy cows in late pregnancy, probably indicating the increased use of these macro-elements by the dairy cows' mammary gland at the early stages of lactation. When the cows were in the lactation period blood serum magnesium levels were significantly lower ($p<0.05$) compared to the values of dairy cows during late pregnancy probably indicating the increased use of magnesium by the dairy cows during the lactation. The results show that the homeostasis of the macroelements tested in the blood of transition and mid lactation dairy cows was maintained, suggesting their adequate supply from alimentary sources.

Key words: *holstein cows, blood serum, calcium, phosphorus, magnesium.*

DOSE- AND TIME-DEPENDENT EFFECTS OF BERBERINE ON BOVINE SPERMATOZA IN VITRO

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Abstract

Many current studies showed that berberine may have antioxidant properties. The aim of this study was to evaluate the dose- and time-dependent *in vitro* effects of berberine on bovine spermatozoa during different time periods (0 h, 2 h, 6 h, 24 h). Semen samples were collected from breeding bulls, diluted, and cultivated in a physiological saline solution containing 0.5% DMSO together with 200, 100, 50, 10, 5 and 1 μmol.l^{-1} of berberine. Spermatozoa motility was measured using the HTM IVOS CASA (Computer Assisted Semen Analyzer) system. The viability of spermatozoa was detected by the metabolic (MTT) assay, and chemiluminescence was used to quantify the generation of sperm reactive oxygen species (ROS). The results of motility showed a significant increase rate during long term cultivation ($P<0.01$ with respect to time 6 h for concentrations 5 and 10 μmol.l^{-1} ; $P<0.01$ for concentration 10 μmol.l^{-1} and $P<0.001$ for concentrations 1 and 5 μmol.l^{-1} with respect to time 24 h). At the same cultivation time periods, the supplementation of several concentrations of berberine led to a significant preservation of cell viability ($P<0.05$ in the case of concentration 1 and 100 μmol.l^{-1} , $P<0.01$ for concentrations 5-50 μmol.l^{-1} with respect to time 6 h; and $P<0.001$ in the case of concentrations 1-10 μmol.l^{-1} after 24 h). After 6 h, the MTT test demonstrated a cytotoxic effect of 200 μmol.l^{-1} concentration of berberine with significant difference ($P<0.01$) compared to the control, as well as after 24 h in relation to 200 μmol.l^{-1} ($P<0.001$) and 100 μmol.l^{-1} ($P<0.05$). Berberine addition (1-10 μmol.l^{-1}) provided significantly higher ($P<0.05$) protection against ROS overgeneration after 6 h, and also in the case of 24 h in the concentrations of 5-50 μmol.l^{-1} ($P<0.001$) and 1 μmol.l^{-1} ($P<0.01$).

Key words: *Berberine, bovine spermatozoa, motility, viability, ROS production.*

THE ABBILITY OF 4-*n*-NP MODUALTED DHEA-S PRODUCTION IN MICE LEYDIG CELLS

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Abstract

In the last decade, research has focused on the potentially hazardous effects of a wide range of chemicals present in the environment. Endocrine disruptors (ED) are substances that have the potential to interfere with hormonal regulations and the normal endocrine system and consequently caused health effects in animals and humans. ED get into environment mainly through anthropogenic activities and include a very heterogeneous group of chemicals, which is not yet complete. One of the widely used ED is nonylphenol. Nonylphenol is the most abundant alkylphenol ethoxylate derivatives, being detected in food products and also is applied in pesticides, detergents and other synthetic products. Leydig cells are primary targets and very sensitive part of reproductive system. Treatment with higher concentrations of nonylphenol may cause significant changes in hormones secretion and essential reproductive parameters like sperm motility or viability. In this *in vitro* study, the effects of 4-*n*-nonylphenol (4-*n*-NP) were examined on the basal and 1 mM cAMP stimulated dehydroepiandrosterone (DHEA-S) production of mice Leydig cells. The cells were incubated during 48 h with addition of 0.04; 0.2; 1.0; 2.5 and 5.0 μg/mL of 4-*n*-NP and compared to the control. Determination of DHEA-S production directly from the medium was performed by enzyme-linked immunosorbet assay. In non-stimulated DHEA-S secretion was recorded slight increase at the doses 2.5 and 5.0 μg/mL. Parallel effect of 1 mM cAMP and 4-*n*-NP initiated significant decrease ($P<0.05$; $P<0.001$) of DHEA-S at the doses of 1.0; 2.5 and 5.0 μg/mL. Further investigations are required to establish the biological significance and possible reproductive implications.

Keywords: *Leydig cells, mice, 4-n-NP, DHEA-S.*

Acknowledgments

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FIRST LIFE CYCLE ASSESSMENT OF MILK PRODUCTION FROM TUNISIAN DAIRY FARMS

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Abstract

Production of milk causes environmental side effects, such as emissions of greenhouse gases and nutrient enrichment in surface water. A life cycle assessment (LCA) is an excellent tool of environmental management and it provides widespread knowledge on environmental burdens associated to a product or to a human activity. In this study, an LCA was performed on 20 dairy farms in Tunisia. The acidification potential of milk production was 87%, due to volatilisation of ammonia. Global warming potential of milk production was for 65%, due to the methane emission. The total GHG emissions expressed per on-farm hectare basis was 12,660 kg CO2-equivalents/ha. The GHG emissions were dominated by enteric methane from animals, while nitrous oxide (N2O) from animal excreta and emissions from N fertiliser were also important contributors. This LCA analysis enables us to quantify the potential impact associated to milk production and also to determine the reductions attained by the application of different improvement actions, such as the most adequate formulation of cattle feed and the implementation of treatment systems for water and air emissions. The consideration of these actions can lead to the maximum reduction of almost 26% of the global normalized impact.

Keywords: *Life Cycle Analysis, GHG, Milk, Environmental impact, Tunisia.*

EVALUATION OF THE GENETIC IMPROVEMENT STUDIES IN LOW INPUT PRODUCTION SYSTEMS: KILIS GOAT

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Abstract

The aim of this study was to evaluate the genetic improvement studies commenced in Kilis, Turkey in 2009 within the context of national genetic improvement scheme for small ruminants in low input production systems. Study data was obtained with questionnaires completed through face-to-face interviews with all Kilis Goat breeders in the scheme along with the breeders out of the scheme equally in number. Kilis Goat breeders were compared regarding twin birth, lamb death, infertility and miscarriage rates, number of kids per parturition, kid live weights at birth and subsequent weighing dates, milk yield, important breeding problems, diseases, internal and external parasites along with gross profit per production unit calculated for every breeder interviewed. Descriptive statistical methods were employed in analysis of the data as student t-tests for independent and paired samples were employed in comparisons. It was found that significant achievements were obtained in twin birth rates, milk yield, number of kid per parturition, kid live weights at birth and subsequent weighing dates as obvious decreases were recorded in miscarriage, infertility and kid death rates. However, no significant difference was detected between the flocks in and out of the scheme regarding breeding problems, goat diseases and pests. Regarding the economic achievement, it was calculated that Kilis Goat breeders of the scheme gained 54,0 more gross profit per production unit. It was also calculated that support payments paid in 2014 were 30,1 TRY per PU. That is, the gross profit surplus (54,0 TRY) achieved as the result of the cumulative advancements since the beginning of the scheme in 2009 is more than 1,8 folds of the support payments paid in 2014. It was concluded that good results were cropped from the scheme, but for the sustainability and higher achievements sheep diseases, pests and breeding problems should be tackled.

Keywords: *Genetic improvement, Kilis Goat, small holder low input systems, gross profit, Turkey.*

USING *LEUCAENA LEUCOCEPHALA* (LEAD TREE) IN POULTRY NUTRITION

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Abstract

Poultry feedstuffs, especially protein sources (soy bean meal, fish meal etc.) are usually scarce and expensive. The high cost and, sometimes, the lack of availability of commercial protein sources is one of the main limitations to efficient animal production in tropic areas. Researchers are therefore looking for cheap, available, and safe alternative sources of protein. A possible cheap source of protein that can be exploited for this purpose is the leaves of tropical legumes and browse plants. One of these alternative protein sources is *Leucaena leucocephala*. *Leucaena leucocephala* is a valuable, high quality fodder tree belonging to family Fabaceae. *Leucaena leucocephala* leaf meal is becoming a popular ingredient in poultry feeds in tropics due to rich source of protein, minerals, vitamins and β-carotene. It has 88.2 % dry matter, 21.8 % crude protein, 15.1 % crude fiber, 3.1 % ash, 8.6 % ether extract and from 700 to 1365 kcal/kg average metabolizable energy content for poultry on dry matter basis. However, utilization of *Leucaena leucocephala* in poultry feeding is hindered by presence of some antinutritional factors such as mimosine. In this review, using possibilities of *Leucaena leucocephala* in poultry nutrition were discussed in the light of the studies on the subject.

Keywords: *Leucaena leucocephala, Poultry, Nutrition.*

RELATIONS BETWEEN TEMPERAMENT AND SOME MORPHOLOGICAL TRAITS IN SHEEP

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Abstract

Individual differences, in terms of personality or temperament, can affect how animals react to new situations, hence to their productive, reproductive performance and behaviors in various social situations. The aim of this study was to evaluate temperament and its association with behavioral and morphological traits (headlength, headwidth, distance between eyes, angle between eyes) including image analysis of ewes. Behavioral responses of 84 Norduz ewes were recorded during 5 minutes in arena and 1 minute in isolation tests. The variables recorded were: number of times an animal cross the zones in the arena, number of bleat elicited in arena, mobility time, number of sniffing stimuli, number of escape attempt and time spend in each zone in arena and movement in isolation test. Using hierarchical clustering analysis, which could help to decide the level of clustering most appropriate to the variables, ewes were divided into two distinct temperament groups which were labeled as calm (n=45) and nervous (n=39). The results of the study did not show significant differences between morphological characteristics across temperament groups ($P>0.05$). The correlations of isolation score with ear width and ear length were -0.22 ($P<0.05$) and -0.25 ($P<0.05$) respectively, while the correlation between mobility and ear width was +0.25 ($P<0.05$). Although the correlations between some behavioral responses and morphological traits were low, it indicated the existence of a relationship. However, in order to have general inferences, further research is needed on the relationship between morphological and behavioral traits with a large number of animals.

Keywords: *temperament, morphology, sheep, arena test, isolation test.*

IMAGING TECHNIQUES FOR ASSESMENT OF KEEL BONE DAMAGES IN LAYING HENS

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Abstract

Keel bone damages represents one of the greatest welfare issues facing the industry, especially in large poultry flocks and non-cage egg production. Many efforts are focused on assessing the keel bone damages in laying hens. Palpation is the most common and the most important method of evaluating keel bone damages due to its low cost and ease of adoption. Despite the technique wide use to detect any hazards on keel bone or chest, it is likely to suffer from poor accuracy, especially when assessors have not undergone proper training. Imaging techniques has already been used assessing health status in a variety of animals. Most imaging techniques use X-ray radiation such as standard radiographs, X-ray absorptiometry or computed tomography for assessing bone hazards. Various ultrasound technologies have emerged providing access to mechanical and biological properties of a healing fracture. Moreover, ultrasound technology not only avoids radiation doses to the poultry but also provides the ability to measure vascularity in the surrounding soft tissue of the fracture and in the fracture itself. Plain radiographs provide the ability to determine the degree of the fracture and to quantify the amount of periosteal callus formation. Absorptiometric measures provide quantitative information on the amount and the density of newly formed bone around the fracture. This paper has been prepared to review the latest technological developments and provide a short summary of imaging techniques with potential to be applied to detect measurable changes in chest or keel surface of laying hens.

Key Words: *Keel bone damages, laying hens, imaging techniques.*

MUTANT DOUBLESEX AND MAB-3 RELATED TRANSCRIPTION FACTOR (DMRT3) ALLELE DISTRIBUTION OF PACING HORSES IN TURKEY

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Abstract

The study was carried out to investigate the DMRT3 mutant allele distribution of 182 Turkish, 31 Iranian, 24 Afghan and 28 Bulgarian pacing horses. Single Nucleotide Polymorphism (SNP) genotyping was determined by the method of 5′ nuclease after isolating DNA from blood and hair samples. A wild type and also one mutant type Polymerase Chain Reaction (PCR) mix was prepared for each sample and the genotypes were read by using these mixtures. Percentages of genotype according to the origins were determined as 85.71, 96.77, 91.67 and 96.43 % for homozygote mutant (AA); 9.89, 3.23, 8.33 and 0.00 % for heterozygote mutant (CA); 4.40, 0.00, 0.00 and 3.57 % for homozygote wild (CC), respectively. The absence of genetic equilibrium ($P<0.001$) was calculated by chi-square test in the Turkish and Bulgarian origins horses used in this research. Mutant allele (A) frequencies were very high level (0.907-0.984) in examined different origin horses, so all these horses were defined as "alternative walking horses". This relationship between pacing gait and genotype should be investigated in these genotypes. Ultimately, the presence of DMRT3 mutant allele in pacing horses in Turkey was detected for the first time. Thus, DMRT3 genotypes might be predetermined and those genotypes could be used to get pacing or gated horses as soon as possible and easily.

Keywords: *DMRT3, horse, mutation, pacing, Turkey.*

ANTIBIOTIC SUSCEPTIBILITIES OF AEROBIC BACTERIA FROM CLINICAL MASTITIC MILK SAMPLES

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Abstract

In this study we aimed to summarize the antimicrobial susceptibility (AS) results of aerobic bacteria from mastitic samples in the period 2015-2017. For this purpose, a total of 134 milk samples from dairy cows with clinical mastitis were examined by culture and the isolates were tested for their AS against different antimicrobial agents. From the milk samples *Staphylococcus aureus* (%21,3), *Streptococcus agalactiae* (%15), *Escherichia coli* (%14,6), *Corynebacterium* sp. (%10), Streptococcus *dysgalactiae* (%5), *Pseudomonas aeruginosa* (%2,6), *Trueperella pyogenes* (%2), *Pasteurella multocida* (%1,3), *Klebsiella pneumoniae* (%0,6), *Aerococcus viridans* (%0,6) were isolated. No bacterial growth was observed from 26 samples (%19,4). AS tests showed that 10 out of the 32 *Staphylococcus aureus* isolates were resistant to Penicillin, 9 resistant to Oxytetracycline, 8 resistant to Ceftiofur, 4 resistant to Ampicillin. Fifteen of the 30 *Streptococcus* sp. isolates were resistant to Oxytetracycline, 5 were resistant to Trimethoprim/Sulphamethoxazole and Ampicillin, 4 were resistant to Ceftiofur and 1 were resistant to Penicillin. Ten of the 22 *Escherichia coli* isolates were resistant to Penicillin, 8 were resistant to Ampicillin, 4 were resistant to Oxytetracycline, 3 were resistant to Trimethoprim /Sulphamethoxazole, to Enrofloxacin, and to Gentamicin, 2 were resistant to Cephalexin. In conclusion, culture results showed that both contagious mastitis cases and environmental mastitis were still problem in our region. Data on AS of the isolates should be absolutely implemented to the isolates if successful antimicrobial therapy of the mastitis cases was expected because the bacterial isolates in the study had different antibiotic susceptibility patterns although some isolates were sensitive to common antimicrobials.

Keywords: *Mastitis, Antimicrobial susceptibility, Bacteria.*

THERAPEUTICAL EFFECTS OF TETRA (*COTINUS COGGYGRIA*) IN RAINBOW TROUT (*ONCHORHYNCHUS MYKISS*), AGAINST *AEROMONAS HYDROPHILA* INFECTION

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Abstract

In this study, therapeutical effects of aqueous methanolic extracts of tetra (*Cotinus coggygria*) against *Aeromonas hydrophila* in rainbow trout (*Onchorhynchus mykiss*) were evaluated. Four different concentration of extract (0 mg/100 µl (Control), 4 mg/100 µl, 8 mg/100 µl, 12 mg/100 µl) were prepared. To compare the results, two different type of antibiotic such as florfenicol and doxycycline were also used. After intramuscular inoculation of *A. hydrophila*, tetra and the antibiotics were given orally using feeding needle to the each individual in all experimental group, and at end of the study survival rate was determined. The highest survival rate was found in Florcenicol group (80 %). 12 mg Tetra group, Doxycycline and 8 mg Tetra group survival rate was investigated as 74.44 %, 70% and 70 % respectively. According to our results, tetra methanolic extract is an effective therapeutic against *A. hydrophila* infection in rainbow trout.

Key Words: *Rainbow trout, immune response, smoke tree, survival rate, A. hydrophila, Cotinus coggygria.*

THE ZOMA LIFE AND BERIVANS IN HAKKARI PROVINCE OF EASTERN ANATOLIA IN TURKEY

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Abstract

The city of Hakkari is located in the most eastern part of Turkey. Small ruminant husbandry activities in Hakkari province are an important source of income for the local people. However, it can be said that animal husbandry activities stagnated for the last 25-30 years. Even though this is the case, livestock husbandry and especially small ruminant husbandry activities are indispensable for the local people. In highland sheep husbandry, sheep flocks are moved to cool highlands with plenty of grassy plains when heat begins to increase and towards the end of spring. For a 3-5 month period, sheep grazing is in control of highland shepherds. One of the most important examples of a transhumant system in small ruminant husbandry is "*Zoma Life*". Zoma life in Hakkari is one of the most beautiful periods of life. Zoma is a term used to refer to going to high plateaus for animal production and semi-nomadic life. In order to get more products such as milk, cheese, wool etc., the people of the region have to go to the highlands with the arrival of spring to find better grazing and water areas for animals. The most important factor for both animals and people that practice the zoma way of living is berivans. *Berivan* is women who milk ewes and nannies. This article discusses the issues related to the zoma life and the berivans in Hakkari. Moreover, author emphasizes the importance of the berivans, and their the problems, the occupational diseases, and the work-related accidents in the zoma life. This information was prepared based on the personal observations and the experiences directly from the area.

Key words: *Berivans, Sheep raising, Transhumant system, Hakkari.*

IMPROVING POSSIBILITIES OF INDIGENOUS NORDUZ GOAT BREEDING IN VAN PROVINCE OF EASTERN ANATOLIA (TURKEY)

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Abstract

Small ruminant activities in Van province of Eastern Anatolia are an important source of income for the local people. However, it can be said that the activities of animal husbandry had stagnated for last years. Even though this is the case, livestock activities and especially small ruminants husbandry are indispensable for indigenous people. The sheep and the goats are raised together in the region. The most important of breeds in the native hair goats of Turkey is Norduz goat breed. The breed of this goat derives its name from the region Norduz, which is the natural habitat of the goat type in Gürpınar province of Van city in Eastern Anatolia of Turkey. Norduz goats have evolved naturally through adaptation to socio-economic and ecological conditions of Norduz region. However, Norduz goat is not a prolific breed. The twin births are rarely seen. Nevertheless, Norduz goats have a higher lactation milk yield and longer lactation length than that of Turkish native hair goats as reported in the literature. In Norduz region, herds of small ruminants are consisted of about 5 goats per 100 reared sheep. Norduz goats were preferred for supplying milk and meat for household for long time periods, to make leadership in small ruminant flock and to enhance the movement capability of flock in pastures and plateaus. Goats are popular among the farmers for their appearance, body size and milk yield characteristics. Norduz goats were generally black, brown and grey. The milk of the goats is either consumed by the household as raw milk or processed as herbaceous cheese. As a result, preservation and development of Norduz goats as a gene source is very important.

Key words: *Goat, Traditional breeding system, Gürpınar province, Norduz.*

DETECTION OF HONEY BEE VIRUSES ON THE TERRITORY OF UKRAINE

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Abstract

A survey of honey bee viruses on the territory of Ukraine has been conducted for the first time in 2016-2017 years. The samples of adult bees, affected combs and mites were collected from apiaries in two regions (Kyiv and Cherkasy). Detailed studying of the bee samples revealed following morphological changes: deformed wings, saccular brood, blackened pistil, changing of the body color. Virus-like particles were observed under TEM after purification of bee samples. Symptomless samples were also analyzed for the presence of bee viruses by RT-PCR. According to results of RT-PCR, we concluded that the following viruses circulate on the territory of Ukraine: Acute Bee Paralysis Virus (ABPV), Kashmir Bee Virus (KBV), Israeli Acute Paralysis Virus (IAPV), Black Queen Cell Virus (BQCV), Sacbrood Bee Virus (SBV) Chronic bee paralysis virus (CBPV). Taken together, these data indicate that bee virus infections occur in bee populations on the territory of Ukraine. Despite the lack of symptoms viruses are often present in colonies and environmental factors might result disease outbreaks that lead to the activation of viral replication in bees.

Key words: *bee virus, bee colony, mites, vector.*

CONCEPTION RATES IN NATURALLY SERVICED AND ARTIFICIALLY INSEMINATED TULI AND AFRICANDER COWS

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Abstract

A study was conducted to compare conception rates between a group of 71 Tuli and 86 Africander cattle bred using artificial insemination technology and through natural service at Matopos Research Institute. Data on animal ID number (ear tag), last calving date, parity, breed of animals, breeding method (inseminated vs. natural mating) were recorded. A Chi square test of association was used for statistical analysis where artificial insemination and natural service were the treatment factors and conception rate was the measured response, while breed, parity and last calving date were non-treatment factors. No significant differences were observed in conception rates between Tuli and Africander breeds, and between cows in different parity levels. However method of breeding animals significantly ($P< 0.05$) affected conception rate. More animals became pregnant when AI (77.6%) was used compared to natural mating (56.79%). Conception rates were significantly lower in cattle with last calving dates spanning more than one year compared to cattle with last calving dates falling within 365 days. Heifers also showed significantly lower conception rate of 48%. In conclusion, the study confirms that conception rates favourable or similar to when cattle are exposed to natural service can be obtained through artificial insemination in Tuli and Africander breeds which are common in the southern part of Zimbabwe. As such, artificial insemination technology can be used to complement natural service in indigenous cattle of Zimbabwe.

Key words: *indigenous cattle, breeding method, pregnancy rates, smallholder*.

NUTRITIVE VALUE OF THE ATRIPLEX (ATRIPLEX HALIMUS L.), FOLLOWING THE PHENOLOGICAL MARKERS, IN STEPPE AREA (ALGERIA)

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Abstract

Atriplex halimus L. (Chenopodiaceae), has a large role in the feeding of livestock as a halophyte plant in the arid and semi-arid zones of the Mediterranean regions. Its adaptation to pedoclimatic conditions gives it ecological and economic importance. This species is used as a forage plant, particularly during the summer drought period, and is highly valued by camelids, sheep and goats, particularly during the lean season. The variation of the nutritive value through the different phenological stages reveals maximum values of UF (0,81/kg of DM of UFL and 0,79/kg of DM in UFV) and in PDI (165g/kg of DM in PDIN), at the flowering stage and mature grains respectively. The sodium level is minimal at the vegetative stage (2,06% of DM) and maximum at the mature grain stage (4,36% of DM). The Ca and P contents are related to the halomorphic character of the soil. The alkaline pH of the soil inhibits the assimilation of phosphorus. Since the Ca/P ratios are balanced for all the phenological stages. In order to be able to reconciling the nutritive values of the Atriplex halimus and its absorbency in Na, it should be exploited in zero grazing, in the mature grain stage. This will make it possible to provide livestock farmers with packaged fodder that will avoid the practice of transhumance (Achaba).

Keywords: *Atriplex, Food, chemical composition, phenology, halophyte plant*.

PRODUCTIVITY AND NUTRITIVE VALUE OF FOREST PASTURES IN NORTH-EASTERN ALGERIA

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Abstract

The region of El Fedden located at the border to Tunisia mountainous areas is forestry-pastoral. The tree species are mainly zeen oak and cork oak. The herbaceous layer present in permanent grassland remains the main source of food in the area existing ruminants. The study of these fields after five years of exclosure; allowed us to determine the yields of green matter, dry and nutritional value through the different phenological periods. The optimum period of operation is the heading period the most representative grass. At this period, the fields at this area develop green matter production 14T / Ha to a dry matter value 2,8T / Ha. At the period of optimal exploitation (heading), the crude protein rate is 13.6%. The evolution of crude fiber rate varies by phenological period of the plant and it is maximum fruit set period with 38.3%. The digestibility of organic matter is the most important period in pasture (0.74%). The protein content is more important at the stage pasture (66.47; 95.03; 20.54 from respectively for PIDA; PDIE and PDIN). The grasslands of El Fedden (municipality of bougous), located north of the Algerian level is at an altitude of 560m, offer opportunities in dry matter production and nutritional value that can be improved. The floristic diversity is a predominantly grass.

Keywords: *food value, pasture, production, Algeria.*

INFLUENCE OF DATE REBUS AND APRICOT KERNEL MEAL ON FATTENING PERFORMANCE OF LOCAL STRAIN RABBITS (ALGERIA)

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Abstract

This article addresses the issue of the valorisation and incorporation of agroindustrial by-products into animal feed. The objective of this study was to determine the effects of incorporation of the complex, apricot kernel cake and date rebus in substitution for imported maize and imported soybean meal, on the fattening performance of rabbits, local "white population". A total of 288 rabbits of both sexes, aged 35 days, were divided into 4 equal lots at a rate of 72 individuals per batch and in packs of 06 rabbits per cage, depending on the rate of maize substitution by date scrap and of soybean meal by the apricot kernel cake (0 %, 10 %, 20 % and 30 %). The change in weight from 35 to 77 days is not significantly different between diets. The average daily gain $_{(35\text{-}77\ d)}$ showed a significant difference for the 20 and 30% diets (+ 6 %), an increase in meat proteins in particular for the 10% (+ 8.8 %) and 30% (+ 5.6 %) batchs and a marked reduction in the lipid content of the 20% (-19 %) batch. The financial gain being 17.3 € on the quintal of food produced. Incorporation of rebus of dates and apricot kernel cake at a rate of 30 % in substitution for maize and soybean meal, is promising and its increase could define its optimum threshold in the diet of the local strain "white population".

Key words: *Rebus of dates, apricot kernel meal, rabbits, local strain, fattening.*

REPLACING FISH MEAL WITH ALTERNATIVE PROTEIN SOURCES IN COMMON CARP'S FEED

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Abstract

The objective of this study was to investigate the effect of PL-68 – which is a by-product of the Monosodium L-Glutamic acid production - as an alternative protein source in the diet of common carp (*Cyprinus carpio*). A four weeks experiment was carried out with common carp (w: 107-198 g, n=54). The protein source in control diet (A) was fish meal, in the experimental diets fish meal was partially (50%) replaced with soybean meal (B) and PL-68 (C). There was a significant difference ($P<0.05$) in the final weight between the treatments, and in the Hepato Somatic Index (HSI) for diet B (2.45 ± 0.70) showed also significant difference ($p<0.01$) from the A and C diets. There was no significant difference for FCR, SGR and condition factor (CF), Viscera Somatic Index (VSI), and Fillet Weight (FW) between groups. All flesh colour parameters did not showed significant differences on the three dietary treatments. Diet A exhibited greatest loss in water during cooking with percentage value of 17.02 ± 1.19 followed by diet C with 18.49 ± 1.86 % and 18.21 ± 2.25 % for diet C. The trend is the same for the dripping loss post mortem 24 hours and thawing after a week. The three different dietary diets exhibited almost similar losses and without significant differences. Same result for the pH values of the meat post mortem 24 hours, no significant difference between three treatments. In conclusion the result of this study showed that PL-68 can partially replace fishmeal in common carp's diets without any adverse effect on growth but further research is needed to evaluate the effect of different inclusion levels of Pl-68.

Keywords: *Fish meal replacement, Soya, PL68, Common carp.*

EFFECT OF NSP DEGRADING ENZYMES AND PREBIOTICS ON QUALITY AND TEXTURE PROFILE OF LAYING HEN'S EGGS

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Abstract

The trial was conducted to investigate the supplementation of NSP degrading enzymes, prebiotics and its combination on the laying hens' performance and quality of eggs. *Lohman Brown* laying hens aged 38 weeks were assigned to 4 dietary treatments for 8 weeks. The dietary treatments were: 1) control (C), 2) compound feed supplemented with enzymes (endo-1,4-β-xylanase 22000 VU/g, endo-1,3(4)-β-glucanase 30000 VU/g and endo-1,4 -β-glucanase (cellulase) 6400 DNS units/g of feed) (E), 3) compound feed with prebiotics (mannanoligosaccharides (MOS) 1.0 kg/t of feed) (P), 4) compound feed with NSP degrading enzymes (endo-1,4-β-xylanase 22000 VU/g, endo-1,3(4)-β-glucanase 30000 VU/g, endo-1,4 -β-glucanase (cellulase) 6400 DNS units/g of feed) and prebiotics (MOS 1.0 kg/t of feed) (EP). All laying hens were kept under the same conditions. Egg's quality was determined using automatic egg quality analyzer and thickness of eggshell was evaluated with electronic micrometer. The texture characteristics were determined with the universal texture analyzer Instron 3343. Instrumental colour measurements of eggs were performed using a spectrophotometer Konica Minolta. Egg weight of E group was increased by 6%, but feed conversion ratio to produce 1 kg of eggs was decreased by 11%, compared to C group ($P<0.05$). Enzymes and MOS did not significantly effect egg quality parameters, but in E group shell weight increased by 9% ($P<0.05$). In addition of enzymes, the hens had produced eggs with higher albumen L* scores ($P<0.05$). Diet supplementation with enzymes had no significant effects on the yolk colour. In E group of laying hens, the egg mass and egg shell thickness were improved. The addition of enzymes and MOS mixture had highest positive effect on egg quality parameters, but had no statistically significant influence of egg's texture and colour.

Keywords: *mannanoligosaccharides, enzymes, laying hens, texture analysis.*

CHEMICAL CHANGES IN LIPID AFTER HEAT TREATMENT FROM DIFFERENT MEAT TYPES

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Abstract

The aim of this paper is to examine the fatty acid composition of the fat from pork and poultry meat before and after heat treatment. For the examination of chemical changes in fat lard, palm and sunflower oils have been used. The changes in weight of the meat before and after heat treatment are followed by measuring with an electronic scale. The contents of total and free fatty acids were assessed before and after heat treatment by gas chromatography. The average quality loss of pork meat after heat treatment was 39.16%, while in the poultry meat was 45.68%. After the heat treatment fatty acid composition from the pork and poultry meat fried in lard showed decreasing of the content of C18: 2n6s and increasing of C16: 0 and C18: 0. Regarding the fatty acid composition from the pork meat fried in sunflower oil, the content of C14:0, C16: 1, C17: 0, C18: 3n6 were decreasing while the content of C16:0, C18:0, C18: 1n9s, C18: 2n6s increased. C21:0 and C22:0 occurred at the fatty acid composition of the poultry meat fried in sunflower oil. When the pork meat was frying with the palm fat, the content of C14: 0 and C16: 0 decreased, while the content of C18:0, C18:1n9s and C18:2n6s increased. In poultry meat, it reduced C16: 0, C18: 3n3 and C18: 3n6, and increased C14: 0 and C18: 0.

Keywords: *pork, poultry, meat, fatty acid, heat treatment.*

IN VITRO EFFECTS OF *ACINETOBACTER BAUMANNII* AND SELECTED NATURAL BIOMOLECULES ON RABBIT SPERMATOZOA MOTILITY

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Abstract

The aim of this study was to assess the potential efficiency of selected biologically active substances on the motility behaviour of rabbit spermatozoa subjected to *in vitro* induced *A. baumannii* contamination. The semen samples used for *A. baumannii* detection were collected from 10 New Zealand white male rabbits and the presence of the bacterium was confirmed using MALDI-TOF Mass Spectrometry. For the *in vitro* experiments rabbit spermatozoa were re-suspended in PBS, containing mineral supplements, BSA and glucose in the presence of $3x10^5$ CFU *A. baumannii* and diverse concentrations of selected biomolecules (resveratrol - RES, quercetin - QUE, curcumin - CUR, epicatechin - EPI, isoquercitrin - ISO). The sperm motility was assessed using the computer-aided sperm analysis at 0h, 2h, 4h and 6h. *A. baumannii* significantly decreased the sperm motility ($P<0.001$) at Time 2h and maintained this negative impact throughout the *in vitro* culture. Meanwhile, the motility at Time 2h was significantly higher in the samples subjected to *A. baumannii* together with 10 μmol/L RES ($P<0.01$); 5, 10 and 50 μmol/L QUE ($P<0.001$); 1 μmol/L CUR ($P<0.05$); 10, 50 and 100 μmol/L EPI ($P<0.01$) as well as 50 μmol/L ($P<0.05$) and 100 μmol/L ISO ($P<0.001$) in comparison to the control exposed to the bacterium exclusively. After 4h, the motility remained significantly higher in the groups co-treated with the inoculum and 10 μmol/L RES ($P<0.05$), 50 μmol/L QUE ($P<0.05$) as well as 50 μmol/L EPI ($P<0.05$) when compared to the positive control. Nevertheless, none of the biomolecules was effective against the rapid decline of sperm motility caused by *A. baumannii* during later stages of the experiment (Time 6h). Based on these results, one can conclude that RES, QUE and EPI exhibit antibacterial properties providing a selective advantage to spermatozoa in the presence of *A. baumannii*, particularly during short-term rabbit semen handling.

Keywords: *Acinetobacter baumannii, spermatozoa, biomolecules, contamination, motility*.

GENETIC STRUCTURE OF WARMBLOOD HORSES ON MOLECULAR-GENETIC LEVEL

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Abstract

The aim of this study was to evaluate the genetic structure and potential loss of diversity within three horse breeds: Lipizzan (42), Furioso (38), and Nonius (18) on molecular-genetic level. The genotyping data were obtained from in total 98 individuals presenting the genepool of analysed breeds in Slovakia. The values of gene diversity (0.72) as well as heterozygosity (0.89) showed the prevalence of heterozygotes within each population. The negative value of F_{IS} index (-0.25) pointed, in particular, to good level of diversity and balanced proportion of homozygous and heterozygous animals in populations, i.e. HWE equilibrium. The Shannon's information index (I=1.41) confirmed sufficient level of variability mainly in order to maintain the current state of biodiversity for future generation. The genetic distances on intra- and inter-population level revealed clearly distribution of individuals into the three separate genetic clusters. The highest genetic similarity was found between Nonius and Furioso breeds (Da=0.16). However, the pairwise F_{ST} values and PCA analysis were not fully sensitive to detect the genetic differences among those breeds. We were able to detect only two genetic clusters, when Furioso and Nonius were linked together. This can be explained mainly by the use of English Thoroughbreds stallions and mares in building up process of both breeds. Considering that the results related to the state of diversity in presented breeds are correct, they can be used as basis for the further progress in breeding programs which is necessary to prevent the loss of heterozygosity and increase of inbreeding.

Keywords: *AnGR, diversity, genetic differentiation, horse breeding, microsatellites variability.*

GENETIC DIVERSITY IN SLOVAK SPOTTED BREED

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Abstract

The objective of the study was to evaluate inbreeding and genetic diversity in Slovak Spotted cattle. Reference population contained genealogic information on 36949 animals (129 sires and 36820 cows) that were used in the analyses. Pedigree completeness indexes in the first three generations were on the level of 100 %, in the 5^{th} generation it was 60 %. Since 1970, inbreeding trend was positive with significant increasing in 1990. Average relationship was 0.8 %, inbreeding rate 0.36 % and $\Delta F = 0.094$ %. In the reference population 43 % animals was inbred, 68 % of sires and 33 % cows, with also 67 % purebred cows, as well. Total genetic diversity loss in the reference population and population of cows was the same, closely under 1%, in purebred cows 1.19 % and sires even due to higher inbreeding level 1.78 %. Genetic diversity loss was more influenced by the genetic drift 0.80% in the reference population, 1.47% in sire group, than by effective number of founder unequal contributions. F statistic showed fines superiority of heterozygosity by sire lines subpopulations, in the whole sire group (F_{IS} = - 0.12) and their minimal differentiation (F_{ST} = 0,098). Obtained results showed that inbreedization process started in this population. Monitoring and better genetic management are important from the point of its further sustainable development.

Keywords: *diversity, inbreeding, pedigree analysis, Slovak spotted, sustainable agriculture.*

GENETIC MARKERS AND BIOSTATISTICAL METHODS AS APPROPRIATE TOOLS TO PRESERVE GENETIC RESOURCES

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Abstract

The aim of presented study was to assess the most suitable way how to distinguish different breeds based on molecular markers. One of the most difficult aspects of quality assurance schemes is their reliability. The verification of fraud needs great efforts in control strategies. The use of DNA markers has been shown to be a useful tool for individual identification. It is necessary to use modern statistical method based on data mining and supervised learning. Supervised pattern recognition techniques use the information about the class membership of the samples to a certain group (class or category) in order to classify new unknown samples in one of the known classes on the basis of its pattern of measurements. Large scale of supervised learning oriented method was used for traceability and identification on individual level. A result of provided study shows the possibility to classify unknown samples according to genetic data. Model is also useful for classification on many logical levels as brand, region and many others. If we take in the account only Slovak and Austrian Pinzgau cattle, based on SNP chip data, it is not possible to separate them using Bayesian approach. Once we considered with the admixture of breeds involved in the historical development as well as inbreeding, selection signatures and migration, we were able to separate even genetically similar breeds. It is possible distinguish between closely related populations based on different markers. We just need to select the appropriate type of analysis.

Keywords: *cattle, markers, supervised learning, structure assessment.*

WEIGHT PRODUCTIVITY AND NUTRITIVE VALUE OF GRASSLANDS: CASE OF MARSHY AREAS IN NORTH-EASTERN ALGERIA

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Abstract

Our work aims to determine the chemical composition, digestibility and forage production capacity of floodplains, in order to determine their quantitative and qualitative potentialities. These data will allow the determination of the optimal time grazing or mowing, related to the nutritional value and dry matter yields per hectare. These data will allow the determination of the optimal date of grazing or mowing, related to the nutritional value and dry matter yields per hectare. Two stations were set up, one at the edge of Lake Tonga and one in the marsh Mekhada. There is a better floristic diversity and a harmonious distribution of grass species (Poaceae) and legumes (Fabaceae), ensuring a good balance of the basic ration (energy / protein) in Lake Tonga. The dry matter (DM) and green (GM) levels were maximal at the heading stage for the two stations with 35.77 t of GM and 26.27 t of DM for Lake Tonga and 1.84 t of GM and 0, 95 t of DM for the marsh. Crude fiber content is less important in the vicinity of Lake Tonga than in the Mekhada marsh with a difference of about 3 percentage points. The level of nitrogenous matter is higher in Lake Tonga (between 21 and 26%). In vitro digestibility remains substantially the same for the same phenological stage and feed values take larger values at the edge of the lake Tonga (0.92 to 1.03 / kg DM). Protein values in Lake Tonga are higher than in the Mekhada Marsh. The floodplains around Lake Tonga offer satisfactory forage potential but remain poor in the Mekhada marsh.

Keywords: *biodiversity, biomass, lake Tonga, Mekhada marsh, phenological stage.*

RESULTS OF INCUBATION AND QUALITY OF DAY-OLD CHICKS HATCHED FROM EGGS OF DIFFERENT WEIGHT

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Abstract

The paper presents the results of incubation and the quality of day-old chicks hatched from eggs of different weight. Total of 450 broiler breeder eggs was divided into 3 equal groups of 150 eggs, according to their weight (S group, 50.0±2.5 g; M group, 55.0 ± 2.5 g; L group 65.0 ± 2.5 g). Following parameters were measured: egg weight loss after 18 days of incubation (%); fertility of eggs (%); hatchability of incubated and fertilized eggs (%); total, early and late embryonic mortality (%); weight (g), length (cm) and yield of day-old chicks (%). Descriptive statistics method was used for data processing, and differences between the groups were tested by using of analysis of variance. The average weight of the eggs in groups of S, L and M was 55.02; 59.66 and 64.98 g, respectively, and significantly differed between groups ($p<0.01$). Average egg weight loss was 10.56; 10.25 and 10.22%, and without significant difference between groups. Hatchability of fertilized eggs was 93.8; 93.1 and 93.2%, respectively, and hatchability of all eggs was 91.3; 90.0 and 92.0%, respectively. Total embryo mortality in groups S, M and L was 6.2; 6.9 and 6.8%, respectively, with 4.1; 2.8 and 4.1% of early and 2.1, 4.1 and 2.7% of late mortality. Hatchability and embryonic mortality were not significantly influenced by eggs weight. The average weight of day-old chicks in S, M and L group was 37.80; 41.02 and 44.65 g, respectively, and the length of chicken was 17.68; 18.01 and 18.06 cm, respectively. The weight and length of chickens were significantly influenced by eggs weight ($p <0.01$). On the basis of these data it can be concluded that all analyzed groups had satisfactory results of incubation, as well as the weight and length of day-old chicks were significantly influenced by eggs' weight.

Keywords: *egg weight, incubation results, day-old chick quality.*

INCUBATION RESULTS OF BROILER HATCHING EGGS STORED IN DIFFERENT POSITIONS

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Abstract

The aim of the study was to investigate the influence of two storage lengths and three egg positions during storage on following incubation results of broiler hatching eggs: egg weight loss; hatchability of incubated and fertilized eggs; total, early, medium and late embryonic mortality. Study was performed in commercial hatchery in north part of Republic of Srpska during 2015. A total of 1050 eggs originated from 32 weeks old parent flock Cobb 500 were divided into six equal experimental groups, depending on the length (7 or 10 days) and the egg position during storage (normal - the large end up; horizontal - eggs in horizontal long axis; inverted - the large end down) and one control group (4 days of storage in normal position). Data processing was performed by using the analysis of variance with *post hoc* test at a significance level of $p<0.05$. Hatchability of fertilized eggs, total and early embryonic mortality were significantly influenced by the length of storage ($p<0.05$). The influence of the egg position on examined parameters of incubation was not significant. Based on these results, it can be concluded that the length of egg storage has a significant influence on the hatchability, while the egg position in the examined storage periods had no influence on the parameters examined in this study.

Keywords: *hatching egg, storage length, egg position, incubation.*

QUALITY AND TECHNOLOGY OF INDIGENOUS TRADITIONAL ‘’BIENO’’ CHEESE IN THE REGION OF MARIOVO, MACEDONIA

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Abstract

“Bieno’’ cheese is an indigenous dairy product in Macedonia with autochthonous traditional production technology which dates back from the Ottoman Empire. The research includes and presents the results of the chemical composition and safety of raw milk used for traditional production of ‘’Bieno’’ cheese, technology and physico-chemical and microbiological quality of ‘’Bieno’’ cheese. The quality of the milk samples was determined within the permissible maximum according to data legislation. It is necessary to respect the hygienic-sanitary norms related to cultivation, preservation and care of the milking herds, and with the right technology of milking. After 45 days of ripening the researchers recorded the average results for the following parameters of the ‘’Bieno’’ cheese: moisture (38.63%), dry matter (61.37%), milk fat (26.89%), milk fat in dry matter (43.83%), proteins (26.53%), ash (9.25%), salt (5.21%) and the average of yield (9.36%). The research specified the microbiological quality of “bieno” cheese after 45 days of ripening in accordance with the special requirements of food safety regarding the microbiological criteria. Nowadays, there is a growing interest of consumers for cheeses produced with traditional technologies, usually based on handmade production, characterized by piquant, unique and specific aromas, atypical for industrial cheeses. The technology, physico-chemical and microbiological quality could be used in the protection of the origin and geographical labelling based on its unique technology. The data obtained serve as the basis for creating standardized production procedures, leading to the uniform quality of these products.

Key words: *Traditional production, raw milk, chemical composition, cheese, microbiological quality.*

AZOXIMERI BROMIDUM - PROTECTIVE ACTION OF IMMUNOSTIMULATOR DRUG IN EXPERIMENTAL TRICHINOSIS OF MICE

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Abstract

Trichinosis is a parasitic disease caused by roundworms of the Trichinella type. Geographic distribution - worldwide. Nematodes of the genus Trichinella are one of the most widespread zoonotic pathogens on the world, and they can still cause major public health problems in many parts of the world. In our study we evaluated the protective effect of azoximeri bromidum in experimental trichinosis of mice. The azoximeri bromidum, is a polymer, a combined innovative product with immunomodulating, detoxifying, and antioxidative action, it is part of the Russian influenza vaccine. An assay was carried out on 20 white outbred mice weighting 16-18 g, divided into 2 groups of 10 animals in each. The first group was injected with azoximeri bromidum; the second group was injected with 0.9% NaCl. The drug was injected twice with an interval of 48 hours intramuscularly in a dose of 0,004 mg/mouse. After 48 hours the mice were infected by Trichinella spiralis larvae in a dose of 80±5 larvae/mouse. Analysis of the data indicates that in the experiment the application of this drug had significant protective effect. The number of T. spiralis larvae detected in animals was 142.5±11.1 larvae/mouse, respectively. This was 31.5 times less than in the mice of control group (4485 ± 430.6 larvae/mouse). Based on this, we consider it is expedient to continue the study of this immunostimulator drug in the complex immunoprophylaxis of trichinosis.

Keywords: *immunostimulator drugs, Trihinella spiralis, immunoprophylaxis, immunomodulators, azoximeri bromidum, mice.*

INFLUENCE OF THE SEASON AND STAGE OF LACTATION ON THE MILK PARAMETERS AND UREA CONCENTRATION IN COW MILK

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Abstract

Urea is a metabolic product in cow's milk and affected by nutritional and some non-nutritional factors. The study was conducted in order to determine the effect of seasons and stage of lactation on milk urea (MU) and other milk production traits (fat, protein and daily milk yield) in Holstein breed cow's milk, from 11 dairy cattle farms in Province of Vojvodina (Republic of Serbia). This research included 35,467 milk samples, from 3223 cows, which were analyzed as a part of Dairy Herd Improvement (DHI) program, from June 2013 to January 2016. Statistical data processing was carried out by applying General Linear Model procedure, Statistics 13. Significant differences in MU concentrations and milk parameters were observed between seasons ($P<0.01$) and stage of lactation ($P<0.01$). The seasonal observation shows the lowest MU concentration (20.61 mg/dl) in autumn period and the highest in spring period (26.89 mg/dl). The highest milk fat and protein content was in autumn, when the daily milk production was the lowest. The lowest concentration of MU was at the beginning of lactation (21.91 mg/dl) and the highest (26.11 mg/dl) was from 121 to 180 days of lactation. The maximum daily milk yield (32.42 kg) was between 61 and 120 days of lactation. It was concluded that milk urea concentration should be evaluated in association with season and stage of lactation and also in association with daily milk yield, fat and protein content in the milk. It could contribute to improving feeding on dairy farms and lead to reduction of feeding costs too.

Keywords*: milk urea, Holstein breed, season, stage of lactation.*

EFFECT OF AGE OF YOUNG SIMMENTAL BULLS ON THE CLASS CARCASS AND DEGREE OF FAT TISSUE CARCASS COVERING

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Abstract

The quality of slaughtered animals is a subject of interest, of both primary production and the meat industry. The aim of the study was to analyze the effect of age of Simmental young beef cattle (bulls) on the class and degree of fat tissue carcass covering in a slaughterhouse in Raska district, according to the standard applied in the European Union (Council Regulation (EC) N 1234/2007, Commission Regulation (EC) N 1249/2008; European Commission, Directorate-General for Agriculture and Rural Development). The rules defining the quality of meat have been partially applied in Serbia (Official Gazette of the SFRJ 34/74, 26/75, 13/78). The quality assessment, classification and determining the degree of the carcass fat tissue covering is performed immediately after a veterinary examination and measurement of the carcasses weight. The study was conducted on 116 young cattle (young bulls) carcasses of domestic Simmental breed from redemption, which are divided into two age groups. The first group were cattle of age from 269 to 350 days (n = 78) and the second 351- 450 days of age (n = 38). The results showed that the tested groups differed significantly ($P < 0.05$) in the values of animals weight prior to slaughter and carcasses weight after primary processing. The average weight of cattle in the first group was 508.89 kg and 531.2 kg in the second, while the average slaughter weight of the hull in the first group was 268.83 kg and 279.97 kg in the second. Both observed age groups had identical average class 4.66. Fat tissue coverage degree of carcass in the first group was estimated an average score of 3.09, while the average rating of fat tissue coverage degree of carcass in the second group was somewhat higher (3.21), but this difference was not statistically confirmed ($P > 0.05$). The given results show that it is necessary to intensify the upgrading of primary production in order to achieve better quality of meat.

Key words: *Age, Simental cattle, Class, Fat tissue coverage.*

THE INFLUENCE OF SPRAYING LAYING HENS WITH TASTE DETERRENTS ON THE PLUMAGE CONDITION AND PRODUCTION TRAITS

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Abstract

This is the first on-farm study looking at the influence of spraying laying hens with two non-toxic bird repellents on feather coverage on six body regions, egg quality and laying performance of the Slovenian Prelux-R layer strain. A total of 180 18-wk-old non trimmed cage hens were randomly assigned into 3 treatment groups (P, T, C) with 6 replicates of 10 birds each (60 hens per group) and for 20 weeks at two week intervals sprayed with two dimethyl anthranilate-based repellents (P and T), each being used on one group of the birds. Group C served as a control group, sprayed with distilled water only. Mean body weights of laying hens at the start of first experimental period, at 26 weeks of age were 2083.42 ± 156.69, 2107.08 ± 194.76 and 2078.75 ± 183.96 g for the P, T and C groups, respectively. We found that hens sprayed with repellents T and P had greater ($P<0.05$) feed intake than group C. The dispersion of repellent T significantly ($P<0.05$) increased the albumen pH and yolk diameter and decreased the egg shape index compared with group P. The egg shell strength and yolk pH were significantly ($P<0.05$) lowered with T treatment in comparison with C group. The administration of the repellents resulted in poorer feather condition compared with group C. The yolk from group P was more intensively ($P<0.05$) coloured than the yolk in other groups. There were no other differences between the treatments. Based on these results, we can conclude that physical egg quality, plumage condition and especially feed intake in commercial flocks of laying hens can be significantly influenced by feather spraying with bird repellents.

Keywords: *Egg quality, Feather coverage, Laying hens, Repellents*.

USING HERBAL MIXTURES IN DAIRY MILK PRODUCTION AND THEIR EFFECTIVENESS DURING APPLICATION ON GROUP FED DAIRY CATTLE

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Abstract

Natural additives, particularly essential oils, phenolic and aromatic compounds and some secondary metabolites originated from herbal sources became popular at last decades in ruminant nutrition by limiting or banning the use of antibiotics, performance enhancers and other growth promoters. In brief, these products help in providing better ruminal ecosystem, preventing excess degradation of soluble protein in rumen and maintaining ruminal ammonia and decreasing energy losses. Consequently, this leads not only to enhancing protein and energy utilization but also to elevating milk production and herd health status of dairy cattle. The objective of this work is to determine the duration of the effect of herbal mixtures on group fed dairy cattle at initial and post-trial period practically and, to determine the reflections of group milk yield. In this study, 98 days-data of high milk producing group (average N, 165) was evaluated for yield, protein, fat, lactose and dry matter contents of milk. Herbal mixture commercially formulated containing aromatic compounds with tannin was added to diet as "on top" 20 g day^{-1} per head. Observation period is described as three session before test (BT-without supplement), test (T), after test (AT-without supplement) and, 18 days, 43 days and 37 days respectively. It was observed that milk yield increased and continued to rise until supplement removing date. While milk protein increasing, milk fat is decreased in (T) test period. There was no decrease in milk yield during the 17 days of the AT. It may be concluded that herbal mixtures can help in sustaining milk production.

Keywords: *Herbal mixtures, additive, dairy cow, nutrition.*

RELATIONSHIP BETWEEN LIVESTOCK PRODUCTION AND FORAGE PRODUCTION IN ALBANIA

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Abstract

Agricultural production in Albania is the main contributor to Gross Domestic Product with 19.8%. The livestock sector accounts for about 48% of agricultural production. However, the livestock business is characterized normally by very small size farms, low level of productivity, and low competitive ability, mainly due to high cost of production and very limited financial support through subsidies or fiscal simplification policies. The study assessed the relationship between livestock and forage production considering the main regions through regression method. The study has showed that the proportion of main forage crops (corn, alfalfa) correlated to a high degree with the structure of animal products from ruminants (milk, meat), although they hardly had incentives to develop harmoniously livestock and forage production. The study makes some prognosis on regional forage crops and livestock species to maximize the production of livestock products in the country. The study shows that increasing the competitiveness of ruminant farms, as well as the cost of milk and meat production from them, can be improved by increasing the quantity and quality of on-farm produced feeds and reduce the use of feed purchased from outside the farm, not only concentrate feed, but also roughages (mainly hay, maize and grass silage).

Key words: *livestock production, forage production, milk costs, meat costs, ruminant farms.*

BACTERIAL CONTAMINATION OF HEAMOLYMPH IN EMERGING WORKER HONEYBEE (APIS MELLIFERA L) PARASITIZED BY VARROA DESTRUCTOR

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Abstract

Varroa destructor is an obligatory ectoparasite of the honeybee (*Apis mellifera* L). The mites use their piercing month parts to suck out heamolymph from immature and adult bees caused direct damage (morphological, physiological abnormalities) and indirect damage due to microbial pathogens. The aim of this work was to research the bacterial microflora in heamolymph of emerging worker honeybee parasitized by *Varroa destructor*. The results showed that the isolates were *Bacillus sp, Pseudomonas sp, Serratia sp, Aeromonas sp* and *Staphylocoque sp.*

Keywords: *Honeybee, Apis mellifera L, Varroa destructor, bacterial contamination.*

BIOCHEMICAL PROFILE OF OULEDDJELLAL EWES WITH SUBCLINICAL PREGNANCY TOXEMIA

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Abstract

Sheep farming in arid and semi-arid regions of Algeria faces large fluctuations in the availability of fodder. This deficiency is particularly burden some for pregnant ewes whose needs are the maximum. This situation will lead to the appearance of metabolic disorders such as subclinical pregnancy toxemia. The present study is conducted to determine the biochemical profile of ewes in late pregnancy with this metabolic disorder. Blood samples were obtained from eighty ewes in late pregnancy (2 to 4 weeks of lambing), aged 3 to 5 years, clinically healthy, multiparous, from eight farms located in an arid area of South Eastern Algeria. Circulating concentrations of glucose, cholesterol, triglycerides, beta-hydroxbutyrate, total protein, urea, albumin, and creatininewere determined using specific commercial kits. The ewes were divided into two groups according to the results achieved in the serum BHB. Thirty sheep were suffering from subclinical pregnancy toxemia (BHB > 0.86 mmol / L), the group was ill, and fifty sheep constituted the control group (BHB ≤ 0.86 mmol / L). The biochemical results were compared between groups using the statistical software Epi Info (version 3.4.3. November 8, 2007). Differences were considered significant when $p < 0.05$. The metabolic profile of sick animals is characterized bysignificantly lower ($p<0.01$) serum glucose and triglycerides, and significantly elevated ($p < 0.05$) rates of cholesterol, beta-hydroxbutyrate, urea, total protein, albumin, and creatinine. Pregnancy toxemia is a major problem in the sheep industry and early dosage of ketone bodies B-hydroxybutyrate in the six weeks before lambing helps preventing and reducing economic losses caused by this pathology.

Keywords: *biochemical profile, OuledDjellal sheep, subclinical pregnancy toxemia, late gestation.*

EFFECTS OF PHENOLOGICAL STAGE OF FLOOD MEADOWS IN NORTH-EASTERN ALGERIA ON THEIR PRODUCTION AND NUTRITIONAL VALUES

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Abstract

The flood meadows of the North-eastern Algeria have production of green and dry material, heterogeneous enough. The shores of Lake Tonga contain a green and dry biomass (35.44 and 26,27T / ha), larger than the marsh of Mekhada (1.84 and 0,95T / ha). The floristic diversity of Lake gives it a greater nutritive value than the marsh. The crude fiber rate is less important to First Lake Tonga as Mekhada marshes around 3 points. The rate of nitrogenous matter is more important at the Lake Tonga (between 21 and 26%), highlighting the richness of this station legumes. In vitro, digestibility remains substantially the same for the same phenological period. The mineral content is higher in the marsh, but the dry matter content is less important. The protein, at the level of the lake is more important (143g / kg DM) than that of the marsh (39,5g / kg DM), because of its richness in leguminous plants. Energy values pass from single to double between the two sites (1,03 et 0,57 UFL/kg DM).

Keywords: *Algeria, food value, forest pasture, production.*

EFFECTS OF PHENOLOGICAL ALGERIAN NORTH-EASTERN FOREST PERMANENT GRASSLAND ON THE PRODUCTION AND NUTRITIONAL VALUE

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Abstract

The region of El Fedden located at the border to Tunisia mountainous areas is forestry-pastoral. The tree species are mainly zeen oak and cork oak. The herbaceous layer present in permanent grassland remains the main source of food in the area existing ruminants. The study of these fields after five years of exclosure allowed us to determine the yields of green matter, dry and nutritional value through the different phenological periods. The optimum period of operation is the heading period the most representative grass. At this period, the fields at this area develop green matter production 14T/Ha to a dry matter value 2.8T / Ha. At the period of optimal exploitation (heading), the crude protein rate is 13.6%. The evolution of crude fiber rate varies by phenological period of the plant and it is maximum fruit set period with 38.3%. The digestibility of organic matter is the most important period in pasture (0.74%). The protein content is more important at the stage pasture (66.47; 95.03; 20.54 from respectively for PIDA; PDIE and PDIN).

Keywords: *Algeria, Food Value, Pasture, Production.*

STUDY OF SEASONAL SEXUAL ACTIVITY VARIATIONS IN ALGERIAN REMBI RAMS

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Abstract

This study focuses on the determination of seasonal effect on two main sexual activity parameters within adult rams of Rembi breed from Algeria for a period of one year. The experiment involved a monthly measurement of scrotal circumference and body weight in order to know the main testicular activity. The purpose of this experiment was to assess better the characteristics of the reproductive activity of rams and to define the variations and interactions between the two parameters during each season. Data shows no statistically significant effect of season on the body weight but showed a significant effect on scrotal circumference. Seasonal variations of the studied parameters showed higher values during spring and autumn and lower values during summer and winter.

Keywords: *Rembi, ram, scrotal circumference, body weight, season, Algeria.*

THE DIET OF ACANTHODACTYLUS SCUTELLATUS (AUDOUIN, 1809) (LACERTIDAE) IN THE ALGERIAN SEPTENTRIONAL SAHARA (OUED SOUF)

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Abstract

The study of the diet of lizard *Acanthodacthylus scutellatus*, was conducted in the Souf region,, in the south-east of Algeria. After analysing the stomach contents of the captured specimens it was possible to measure the relative abundance of the consumed preys. The diet was composed of the hymenoptera (38.4%), homoptèra (30.4%), coleoptera (12.2%), lepidoptera (6%), diptera (5.6%), dermoptera and collembolan (0.4%), and finally of the arachnida and plants. It was found that the males consume much of the hymenoptera, whereas the females prefer the homoptera. The authors have to conclusion that the diet varies according to the sex (males and females) and the habitats (Palm grove and the Erg). They also found the relation between qualities and quantities of prey and the size of the individuals of *Acanthodacthylus scutellatus*.

Key words: *Reptiles, Acanthodacthylus scutellatus, diet, prey, Souf.*

CONTROL REGION OF mtDNA IDENTIFIES THREE COLONIZATION EVENTS OF SHEEP BREEDS IN ALGERIA

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Abstract

The origin of North African sheep breeds has never been investigated using molecular methods. Here we present a comparison between 23 new sequences of the whole Control Region of mitochondrial DNA of three thin-tailed breeds: Ouled-Djellal, Rembi and Berbère. The sequences of these animals were included in a dataset containing 320 sequences of 28 breeds (haplogroups A, B, C, D, and E) to assess their phylogenic position. It appears that 87% of Algerian individuals belong to haplogroup B, the rest to haplogroup C only recorded among Ouled-Djellal breed. Given the scattered nature of Algerian individuals within the tree, Minor Allele Frequencies of each breed was calculated to construct a distance tree and a network through Reduced Median method. These data were used to estimate the divergence dates of the Algerian breeds, indicating that they appeared through three independent colonization events and not through local differentiation following only one colonization event. Ouled-Djellal breed would be the latest to come from Middle-East, given the significant percentage of C haplotype in our sampling.

Keywords: *Control region, mtDNA, Ovine breed, Colonization event, Algeria.*

HARMFUL EFFECTS OF DERMATOALLERGIC PRODUCTS APPLIED CUTANEOUSLY TO RABBIT

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Abstract

Para-phenylenediamine (PPD) is a black dye used in permanent oxidative hair dyes. It is a major cause of allergic contact dermatitis. So these studies were designed to confirm this effect on the skin. Eighteen adult domestic rabbits were divided into three groups, first group used as control, second group painted with PPD in a conc. of 2%. Third group painted with PPD (2%) and administered antox (2mg/animal/day) in the diet as antioxidant. PPD applied twice weekly for 6 months. The results were areas of alopecia, necrosis of skin, sensitization of skin (patchy hyperemia). Histopatholgical sections revealed sever dermatitis with infiltration of the dermis with a great number of eosinophils, Folliculitis and perifollculitis were also seen. Tubulonephritis, myocarditis and rhabdomyolysis were also reported, as well as leukocytosis with prominent eosinophilia in the blood. In the third group antox did not protect the skin of rabbits from the deleterious toxic effect of PPD.From these results we can conclude that PPD was associated with allergic contact dermatitis, its toxic effect extends to circulation and internal organs, so strict control of its practical uses should be adopted.

Key words: *para-phenylenediamine, Allergic contact dermatitis, Rabbits*.

OPTIMIZATION OF NONSURGICAL CASTRATION THROUGH A BILATERAL INTRATESTICULAR INJECTION OF CHEMOSTERILIZING AGENTS IN BLACK BENGAL (*CAPRA HIRCUS*) BUCKS

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Abstract

The study was aimed to introduce nonsurgical castration by intratesticular injection of calcium chloride, sodium chloride and citric acid solutions in Black Bengal bucks. Twelve healthy bucks were divided randomly into four groups consisting of three bucks in each of Group A, B, C and D. Local infiltration with 2% lidocaine hydrochloride in spermatic cord was applied in each buck followed by bilateral intratesticular injection of 30% $CaCl_2$, 25% NaCl and 50% citric acid solutions @ 2 ml per testis in each buck of Group A, B and C, respectively. The control bucks (Group D) received 2 ml sterile deionized water intratesticularly. To evaluate the efficacy of chemical agents on inactivation of testes, clinical parameters, changes in scrotal circumference, testicular fine needle aspiration (TFNA), histopathology and serum concentration of testosterone and LH were monitored. A significant ($P<0.05$) decrease in the scrotal circumference was observed from day 0 to day 14 in all the treated bucks. Azoospermia was observed on day 14 post-injection in the treated bucks except one in the group C. Histopathology revealed massive destruction of seminiferous tubules and disorganization of the testicular parenchyma in the treated bucks. Serum testosterone concentration declined significantly ($P<0.01$) from day 0 to day 14. Consequently, a gradual elevation in serum LH concentration was found significant ($P<0.05$) from day 0 to day 14. These findings revealed that intratesticular injection of chemosterilizing agents could induce chemical based nonsurgical castration in Black Bengal bucks.

Key words: *castration, intratesticular injection, chemosterilizing agents, testicular fine needle aspiration, assay of Testosterone and Luteinizing Hormone.*

ENHANCING SMALL-SCALE SHEEP PRODUCTION IN ETHIOPIA BY USING LOCAL FEED RESOURCES

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Abstract

There is a growing demand for sheep meat in Ethiopia, due to the cultural preference, increasing population, urbanization and income. In response to it, the supply of sheep meat needs to increase. This can be an opportunity for poor producers to improve their livelihoods. Commercial sheep fattening is the key strategy. However, feed shortage is a major barrier. Farmers cannot afford sources of industrial nutrients, which calls for finding local feed resources. This study evaluated the impact of three browses, namely *Cordia monoica, Cordia uncinulata*, and *Dichrostachys cinerea*, on the production and economic performance of sheep fattening. The control diet was barley-straw and noug-cake. Varying degrees of the browses were allotted in the treatments. The daily intake of total dry matter of the sheep fed with supplemented diet and the control group of sheep were significantly different ($P<0.001$). The average daily weight gains differed between in the groups of sheep fed with *C. uncinulata, D. cinerea* and *C. monoica* and the control group. Dry matter digestibility was significantly higher ($P<0.0001$) for the *C. uncinulata* and *D. cinerea* groups compared *to the C. monoica* group and the control group. Similarly, the *C.uncinulata* and *D.cinerea* supplemented groups had significantly higher ($P<0.0001$) apparent CPD than the *C. monoica* group and control group. The highest mean slaughter weight, empty body weight and hot carcass weight was obtained from sheep fed with *C. uncinulata* and *D. cinerea*. A partial budget analysis shows that every dollar invested to apply *C. uncinulata, D. cinerea* and *C. monoica* as new technologies can give a return of 4.00, 3.28 and 0.53 dollars, respectively. If browse production, processing and use are technically and institutionally supported, there is a potential for enhancing sustainable and market-oriented smallholder sheep farming in Ethiopia.

Key words: *Browses, Ethiopia, market, sheep.*

EFFECT OF FENNEL (*FOENICULUM VULGARE*) ROOT POWDER ON PERFORMANCE, IMMUNE RESPONSES AND CARCASS CHARACTERISTICS IN BROILER CHICKS

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Abstract

An experiment was conducted to investigate the effect of using fennel root powder in diet on performance, immune responses, carcass characteristics of broiler chicks and chicken meat pH and malondialdehyde (MDA). This experiment was conducted in a completely randomized design with 6 treatment, 4 replication and 20 chickens per each replicate. Experimental treatments were: (1) The basal diet (Control); (2) The basal diet + 2 g/kg fennel root powder; (3) The basal diet + 4 g/kg fennel root powder; (4) The basal diet + 6 g/kg fennel root powder; (5) The basal diet + 250 mg/kg antibiotic (Avilamycine); (6) The basal diet + 200 mg/kg probiotic (Multi strain). Feed intake, body weight gain, feed conversion ratio, viability, feed cost per kg body weight gain and production index were evaluated. Immune responses of broiler chickens (SRBC, IgG and IgM titers) were studied in 35 days of age. At the end of experiment, pH and MDA were investigated in chicken meat keeping in the refrigerator for 7 days or in the freezer for 28 days. Experimental treatments had no significant effect on broiler body weight at 42 days of age. However, antibiotic treatment led more weight gain in comparison with the other treatments. The treatment 4 g/kg fennel root powder was similar to antibiotic treatment but 6 g/kg fennel root powder showed minimum weight gain. In the total period, experimental treatments had effect on feed conversion ratio, and the best feed conversion ratio were observed in antibiotic treatment and difference with other treatment were significant. In the total period, experimental treatment had no effects on viability and production index. Feed cost per kg body weight was different between treatments. Minimum cost was related to probiotic treatment and maximum cost was related to 6 g/kg fennel root powder. SRBC and IgG titers in treatments including fennel root powder were higher than in the control group.Difference between 2 g/kg fennel root powder and control group was not significant but difference of 4 and 6 g/kg fennel powdercompared with the control group was significant. Experimental treatments had no significant effect on chicken meat pH after it was kept in refrigerator at 4 C for 7 days. Experimental treatments had no significant effect on chicken meat MDA after it was kept at 4 C for 7 days in refrigerator and kept at -19 C for 28 days in freezer. The use of fennel root powder in all levels and also use of antibiotic and probiotic in comparison with control treatment decreased MDA in meat after storage in 4 C for 7 days in refrigerator. According to the results of this experiment and because of positive effects of using fennel root powder on immune responses of broiler chickens and storage capability of chicken meat, the use of 2 g/kg fennel root powder could be recommended.

Keywords: *Broiler, Fennel root powder, performance, immune responses, chicken meat quality.*

STUDY OF LEPTIN RECEPTOR GENE POLYMORPHISM AND ITS ASSOCIATION WITH GROWTH TRAITS IN KURDI SHEEP USING PCR-SSCP METHOD

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Abstract

Leptin (LEP) is produced primarily by adipocytes and plays a critical role in the regulation of body-weight through reducing food intake and stimulating energy expenditure. It exerts its physiological action through the leptin receptor (LEPR). The present study aimed to investigate the polymorphism of leptin receptor gene and its association with growth traits in Kurdi sheep of North Khorassan (Iran). Blood samples were randomly collected from 120 Kurdi sheep and DNA extraction was performed by salting-out chloroform method. A fragment of 269bp from exon two of ovine LEPR gene was amplified by the polymerase chain reaction (PCR) and analyzed by single-strand conformation polymorphism (SSCP) to get the patterns of single-stranded DNA separated by native polyacrylamide gel electrophoresis and visualized by silver staining. Three different patterns, AA, AB and AC, were found with the frequencies of 0.21, 0.24 and 0.55, respectively. Association analysis was performed using the GLM procedure in SAS and showed a significant relation with birth weight ($p<0.05$) and daily gain from birth to weaning ($p<0.01$). Animals with the AB pattern had higher weaning weight and much more daily gain from birth to weaning rather two other patterns. Our results propose that B allele has the positive effect on growth traits and can be considered as a candidate in the marker assisted selection program.

Keywords: *Leptin receptor gene, Polymorphism, growth traits, Kurdi sheep, SSCP*.

THE EFFECTS OF ZINC-METHIONINE AND ZINC-GLYCINE SUPPLEMENT ON BROILER PERFORMANCE AND IMMUNITY

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Abstract

This study was carried out to evaluate the effects of two sources of organic Zinc on performance and immunity of broiler chickens in Animal Science Research Institute of Iran (ASRII) in 2016. Seven-hundred and fifty day-old Arian broiler chickens were randomly allocated in 30 experimental units. The experiment was conducted in a completely randomized design as a 2×3 factorial with two sources of organic Zinc (Zinc- methionine and Zinc- glycine) and three levels of dietary Zinc (40, 80 and 120 mg/kg). During the experiment Live Body Weight (LBW), Feed Intake (FI) and Feed Conversion Ratio (FCR) were measured weekly. At the end of the experiment (age 42) two birds from each replicate were bleed to measure total antibody titer against Sheep Red Blood Cell (SRBC), antibody titer against Newcastle Disease virus (ND) and white blood cell differentiation. Dietary inclusion of Zinc-methionine improved LBW (day 42), FI (days 0-28) and FCR (days 0-42) in comparison with Zinc- glycine ($P<0.05$), but did not have influence on productive index and livability ($P>0.05$). Dietary supplementation of 40 or 80 mg/kg Zinc increased LBW (day 7) comparing to 120 mg/kg Zinc ($P<0.05$). Antibody titer against SRBC was higher when 80 mg/kg Zincwas included in diet.

Keywords: *Broiler, Dietary Zinc level, Immunity, Organic Zinc source, Performance.*

INFLUENCE OF EXTRUDED RAPESEEDS AND FABA BEANS MIXTURE ON RUMEN FLUID PARAMETERS AND PRODUCTIVITY OF DAIRY COWS

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Abstract

The purpose of this study was to assess the influence of a mixture of extruded rapeseeds (50 %) and fodder beans (50 %) for dairy cows on fermentation processes of rumen fluid, milk productivity and quality. Thirty holsteinizated Lithuanian cows of black-and-white breed of II-IV lactation were selected and divided into two groups (15 cows for each) for this study applying the principle of analogous groups. The number of infusoria, the rumen reduction activity of bacteria, pH, total volatile fatty acid (VFA), total content and ammonia nitrogen were investigated during the whole experimental period. Milk quantity, composition, and quality indicators were estimated during control milking; fat, protein, lactose, and urea were assessed with the "LactoScope FTIR" instrument (FT1.0. 2001; Delta Instruments, the Netherlands). The investigation showed no crucial influence of the extruded rapeseeds and faba beans mixture on microbiological and biochemical indicators as well as milk composition and quality indicators of dairy cows' rumen content. However, the milk yield during the whole investigation period of the experimental cow group produced 1.08 kg per day, i. e. 5.2 % more milk compared to the controlled group of cows.

Keywords: *Dairy cow, mixture of rapeseeds and faba beans, rumen, milk production.*

PERFORMANCE OF GROWING RABBITS (*ORYCTOLAGUS CUNICULUS*) FED DIETS CONTAINING GRADED LEVELS OF GMELINA FRUIT PULP MEAL

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Abstract

The study involved the recycling of gmelina fruit pulp to reduce environmental pollution by evaluating the feed intake and body weight changes of rabbits fed diets incorporating ripe gmelina fruit pulp (RGFP) at 0, 25, 50, 75 and 100% in replacement of maize as groups I, II, III, IV and V, respectively. Sixty rabbits in five groups of 12 animals each were used for the eight week study in completely randomized design format. Initial weight, final weight, weight gain, feed intake (concentrate + forage), concentrate intake and forage intake ranged from 575-575.02g, 1605-1900g, 1029.98-1324.99g, 8130-7569.85g, 5711.33-1177.11g, 6392.74-2418.67g, respectively. Feed conversion ratio (FCR), water intake (ml), water-feed ratio and protein efficiency ratio ranged from 7.35-6.14, 278.34-203.36, 0.034-0.027 and 0.8-0.53, respectively. Weight gain, total feed intake (concentrate + forage), concentrate intake and water intake of group I were the highest while group V recorded the least. Weight gain and total feed intake of group I was similar to those of groups II, III and IV. Group V had the highest forage intake but least FCR, while group I had the least forage intake and highest FCR. Weight gain, total feed intake (concentrate + forage), concentrate intake and water intake decreased as RGFP increased while FCR and forage intake increased as RGFP increased. This study suggests that RGFP could replace 50% of maize without deleterious effects on rabbits.

Keywords: *Hindgut fermenter, fruit waste, rabbit nutrition, environmental pollution.*

SEASONALITY IN SMALLHOLDER EGG VALUE CHAIN IN GREATER PORT HARCOURT CITY, NIGERIA

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Abstract

Seasonality in smallholder chicken egg value chain in Greater Port Harcourt City (GPHC) was studied using exploratory research with value chain lens. Focus Group Discussion with eight egg producers was carried out to obtain insight regarding seasonal influences on the egg chain. Six wholesalers (3 hawking and 3 sedentary), six retailers (3 supermarket and 3 small shops), three intercity traders, six institutional consumers (3 Boarding Secondary School and 3 Fast food chain), and the Chairman, Poultry Association of Nigeria, Rivers State, were interviewed one-on-one using a checklist. Quantitative data was analyzed using Microsoft Excel while qualitative data was analyzed using thematic analysis. Results indicate that egg production in GPHC is grossly inadequate to meet the demand, thus, encouraging influx of eggs into GPHC from other parts of Nigeria. Egg production, demand and supply in GPHC is highly influenced by school calendar, Christmas and end of year/new year vacations. Also, smallholder egg production is poorly planned, causing seasonal scarcity and glut. To eliminate seasonal scarcity and glut, and capture the full benefits of the high demand periods for stakeholders especially smallholders, extension workers and egg producing entrepreneurs need to emphasize planned production and cost minimization strategies to increase local production and supply competitively priced eggs throughout the year.

Keywords: *Seasonal calendar, glut, school calendar, vacation, festivals, inter-city trade.*

ACARICIDAL EFFECT OF SOME EXTRACTS AGAINST THE RED POULTRY MITE, DERMANYSSUS GALLINAE (MESOSTIGMATA: DERMANYSSIDAE)

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Abstract

The red poultry mite (*Dermanyssus gallinae*) is an economically damaging parasite of the poultry industry worldwide. The mite can cause irritation, restlessness and severe anaemia, occasionally resulting in death. Due to a lack of proper management and the poor application of commercial products, *D. gallinae* can develop resistance and cause severe infestation in poultry birds. There are also many side effects of using pesticides. Therefore, the aim of this laboratory study was to determine the efficacy of some plant and mushroom extracts against *D. gallinae*. A completely randomized design was used with ten treatments. They were mushroom extracts from Lentinula edodes, Ganoderma lucidum and Pleurotus eryngii; an extract from Echinacea purpurea leaves; essential oil formulations of Gamma T-Ol (Tea tree oil) and Fungatol plus Neem (combination of tea tree oil with neem oil), Neemazal at two doses (1% and 2%), methanol and distilled water as the control. Experiments were replicated five times, with five mites in each replicate. Observations were made after 12 hours, then daily until all the mites were dead in each treatment. The efficacy of each treatment was determined with the Abbott formula. Fungatol plus Neem (88%) and L. edodes extract (80%) were the most effective treatment, followed by G. lucidum extract (76%) and the 2% and 1% Neemazal doses (72% and 64%, respectively) against poultry red mites within three days.

Keywords: *Red mite, Dermanyssus gallinae, mushroom extracts.*

CURRENT STATUS AND FUTURE OF THE DAIRY SECTOR IN PAKISTAN

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Abstract

The dairy sector is an important component of Pakistan's economy. This sector produced 54.32 million tons of milk in 2015-16, making Pakistan the 3rd largest producer of milk in the world. It is a net source of foreign exchange earnings, constituting more than 8.5% of the total exports. Presently, the dairy industry in the country is dominated by the private sector, multinational as well as national companies, primarily producing dairy commodity products, mainly UHT fluid milk, milk powder and yogurt and to a lesser extent cheese. In spite of rapid development, the dairy sector of Pakistan is in a transitional stage, confronting numerous problems that are hindering its future growth and development. On the issues and challenges side, presently Pakistan's dairy industry is facing problems like extensive commercial dairy farming, lack of dairy-related education, lack of financial and infrastructure facilities, especially to livestock farmers in deep rural areas, lack of a systematic national breed improvement program, lack of availability of good quality fodder and nutrients, poor farm management practices and no adaption to modern technology for production. It is vital that people critically review and resolve the issue of the dairy sector by coordinating research and extension activities, keeping in mind the previous policies regarding livestock production and requirements.

Key words: *Dairy sector, Current issues, Livestock, Pakistan.*

REPLACEMENT OF SOYBEAN MEAL WITH SILKWORM MEAL IN THE DIETS OF WHITE LEGHORN LAYERS

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Abstract

This study elucidated the effect of replacing soybean meal with silkworm meal on production performance, digestibility of nutrients, hematology and egg quality traits in white Leghorn layers. A total of 150 white Leghorn laying birds (52 weeks of age) were randomly divided into fifteen replicate groups (n=10 per replicate), and reared on five experimental diets having three replicates allocated to each treatment group for a period of six weeks. Five isonitrogenous and isocaloric diets (D) were utilized as; 0 (D1), 25 (D2), 50 (D3), 75 (D4) and 100% (D5) as replacement of soybean meal with silkworm meal in commercial layer rations. The weight of the bird, daily feed intake (g/day/bird), hen day production (%), average egg weight (g), and feed conversion ratio did not differ significantly (P>0.05) among the dietary groups. Dry matter digestibility was numerically higher in the control group compared to group D2, D5 and D3. Blood profile and egg quality parameters showed no significant (P>0.05) differences among dietary groups.The egg weight, albumen height, yolk weight and shell thickness were also not affected (P>0.05) by dietary treatments. Based on our results, it could be concluded that silkworm meal can be effectively used as an alternative protein constituent to soybean meal without any adverse effects on the performance of laying birds.

Keywords: *Soybean meal, Silkworm meal, Layer production, Nutrient digestibility, Egg quality*.

CULLING ANALYSIS OF PUREBREED PIETRAIN BOARS AND ITS CROSSBREED VARIATION

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Abstract

Culling analysis has a strong relation with profitability of AI stations. The genotype structure of boars is strictly tailored to the country-region demand on insemination doses, and Pietrain breed as purebreed or component in crossbreeding program is of great importance. The aim of the study was culling analysis of purebreed Pietrain boars and its crossbreed variation. The research material consisted of 21 Pietrain boars, 25 Duroc×Pietrain boars, and 20 Hampshire×Pietrain boars. Based on the production documentations were selected following culling reasons: low semen value, low or lack of libido, leg problems, infectious diseases, old age, reduced demand, and others. The highest percentage of culled boars due to low semen value was noted for Pietrain boars (even 7% more than for Hampshire×Pietrain boars). Very close percentage culling value regardless of genotype were reported for low and lack libido (mean close to 9%), leg problem (mean close to 13%), and infection diseases (mean close to 10%). The lowest number of culled boars was observed for Duroc×Pietrain boars and almost twice higher for Pietrain boars. However, reverse observations were noted for reduced demand (over 30% for Duroc×Pietrain boars and almost 15% for Pietrain boars). Other culling reasons were the highest for Hampshire×Pietrain boars. The results clearly presented that culling reasons are partially determined by the genotype. Therefore, the culling analysis of Pietrain boars and their crossbreed variations may be of a great importance for proper AI stations management.

Keywords: *Boars, Culling, Genotype, AI stations.*

ENDOPARASITES OF SOWS DURING LACTATION DEPENDING ON THE MAINTENANCE SYSTEM

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Abstract

Animals infected with gastrointestinal nematodes are characterized by reduced productivity, poisoning the body with products of parasitic metabolism, which can lead to even a death, resulting in an increase in the overall cost of keeping animals. Quick identification of the problem allows an effective treatment program. Feaces samples were collected from 100 sows during lactation held on grate and shallow litter. Analysis diagnosed and identified *Oesophagostomum* spp., *Ascaris suum* and *Strongyloides ransomi.* The prevalence of infection was 43.3% in lactating sows held on grate, while on shallow litter the vast majority of animals were infected and the prevalence was 95.4%. Difference between these results were highly statistically proven: χ^2 (df = 1, n = 200) = 56.3; $p < 0.01$, and relation between maintenance system and prevalence were strong: $\varphi = 0.54$; $p < 0.01$. There was also a statistically significant difference in the mean of EPG (U = 1064.0; $p < 0.01$), and mean of EPG for sows held on shallow litter were than 5 times higher than for sows held on grate (2412.8 EPG *vs.* 473.0 EPG). Sows during lactation were 2 times higher on grate (92.5% *vs.* 46.3%). Mean EPG – similar as prevalence – were higher for sows held on shallow litter than on grate (2394.6 EPG *vs.* 473.0 EPG).

Keywords: *Lactating sows, Endoparasites, Maintenance system.*

A QUALITY ASSESSMENT OF PORK DEPENDING ON THE COLLECTION PLACE OF LOIN SAMPLES

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Abstract

The place on loin for a quality assessment of pork has still not been precisely defined, although the most popular are the anterior end or the space between the 3rd and 4th last rib. The above lack of precision can result in an inaccurate assessment. Therefore, the aim of the study was to compare two collection places of loin samples on pork quality results. The pork samples (n=52) were taken from the anterior end and the place between the 3rd and 4th last rib of loin. The meat analysis included: color (L* a* b*), marbling (visual assessment), pH value and water holding capacity. The instrumental assessment of color differed statistically ($p \leq 0.05$) between the locations only for L* (respectively 52.18 vs 50.66) and a* (respectively 6.71 vs 7.04), but not for b* (respectively 12.26 vs 12.24). About 25% lower marbling was noted for the place between the 3rd and 4th last rib of loin in comparison with the anterior end ($p \leq 0.05$). pH value differed significantly ($p \leq 0.05$) according to the analyzed places, with a higher value for the anterior end (respectively 5.90 vs 5.70). Higher water holding capacity was recorded. However, like for marbling, for the place between the 3rd and 4th last rib of loin and the difference reached about 1% ($p \leq 0.05$). This study demonstrated that the collection place of loin samples has a significant impact on pork quality assessment results. Therefore, precise standardization of the collection place is necessary for the objective presentation and comparison between results worldwide.

Key words: *Pork, Quality, Loin, Location.*

INFLUENCE OF SEX AND BREED OF HORSES ON THEIR TASTE PREFERENCES

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Abstract

Rewarding horses is commonly used. However, it is not known which flavor of the feed is mostly liked by horses, what is the reason of this phenomenon and how it is affected by individual animal properties. The aim of the study was to find the feed preferences of the horses with regard to their breed and sex. We studied adult stallions and mares (in equal numbers): 20 warmbloods, 20 coldbloods and 20 primitive horses. The horses were fed with five kinds of feed which are assumed to be a tidbit for this species and the horses were familiar (jds: pellet of sweet dessert apples; jkk: pellet of acid culinary apples; zs: cereal pellet with addition of salt; mk: pellet of culinary carrot; wm: pellet of pulp with molasses). The feeds were separately put to a five numbered buckets. The buckets were placed consecutively abreast on the litter near the box wall. Then, the horse was led into the box. In order to eliminate the effect of randomness, the experiment was repeated for three days with the order of buckets changed. The horses were observed and the time necessary to eat the tidbits was measured. In the case of coldblooded horses, the following ranking of feeding tidbits was found: 1) mk, 2) jds, 3) jkk, 4) zs, 5) wm. Feeding the tested tidbits by warmbloods came out to be random, without accented preferences. Mares were considerably less interested in feeding wm than stallions, which was particularly seen in warmbloods. The mares reluctantly ate jkk as well. In the case of stallions, zs was fed as the last one. It was also found that the mares required more time to choose a tidbit compared to the stallions. The mares' behaviour was described as lack of certainty in undertaking the decision to eat a certain kind of tidbit.

Keywords: *horse, positive reinforcement, sense of taste.*

MODIFICATION OF ASSESSMENT METHOD OF POLISH KONIK HORSES DURING PERFORMANCE TEST

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Abstract

Preservation of biodiversity aims at maintaining particularly valuable animal traits at an unchanged level. Polish Konik is a horse breed preserved since 1999. In this case, the following qualities are particularly protected: vitality, compensation of growth, acclimatization ability, resourcefulness under severe circumstances and endurance connected with lenience and capability. In spite of the conservation programme which includes 100% of the population, these horses are actively used, hence since 2000 their performance is tested in a standardized way. The tests may be conducted because in the programme of biodiversity conservation for Polish Koniks, improving the quality of movement is allowed. However, regarding the conservation programme, suggestions of modification of the test are treated with caution. This caution results in low variation of test results and tendency of giving many maximum notes. In consequence, the test does not perform its function. With regard to the problem which appeared, a project of verifying the assessment method of Polish Konik horses during performance test was undertaken, which was the main objective of the study. In the analysis, results of performance test of 55 horses were included. Five new intervals of particular test elements based on mean trait value and SD were established (1 point: trait value lower than mean – 2 SD; 2 points: trait value between mean – 2 SD and -1 SD; 3 points: trait value equal to mean ± SD; 4 points: trait value between mean + 1 SD and mean + 2 SD; 5 points: trait value higher than mean + 2 SD). Until now, equal intervals included between extreme values, were used. Multifactorial analysis of variance and T-Tukey test were performed. It was found that the suggested modification may be used, since the distribution of the notes for the performance test was changed towards normal distribution.

Keywords: *horse, Polish Konik, performance test.*

COMPREHENSIVE SYSTEM OF TREATMENT AND PREVENTION OF KETOSIS IN DAIRY COWS

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Abstract

The presence in the herd of pathologies such as displacement of the abomasum, metritis, mastitis, a high percentage of fat cows at calving, which suffer from feed refusal after calving, is the basis for monitoring for detection of subclinical ketosis. In cows before and after calving a good appetite should be maintained, to cover the intake of dry matter and energy with the rapid increase in milk production. Described ways to prevent and treat ketosis demonstrated good efficiency, however, they had different base cost, so the choice may be dictated by economic considerations.

Key words: *cows, ketosis, treatment of ketosis, Kexxtone, pathogenesis of ketosis, metabolism.*

BROILER MEAT PRODUCTION IN SAUDI ARABIA – TRENDS AND FORECAST

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Abstract

The poultry industry in Saudi Arabia has been growing at a steady rate, in spite of various hurdles and challenges it has faced during the recent years. Currently,Saudi poultry industry is catering, approximately, 44 % of the poultry meat consumption is in the country,the rest is imported from other countries – mainly Brazil.Over a couple of years, there is a decreasing trend in the import of broiler meat in the country. In 2016, a decrease of 2 % in total broiler meat import was observed as compared to 2015. The total broiler meat import in the country was 940,000 metric ton (MT) in 2016,as compared to 959,000 MT in 2015. The same trend is expected in 2017. An import of 930,000 MT broiler meat is anticipated in 2017 – almost 1 % less than the total volume imported in 2016.For the last 02 decades, Brazil has been getting a major share in Saudi broiler meat imports,on an average 82 % of total imports. During the 1st half of 2016, Brazil has contributed 81 % of total broiler meat import, while its share was increased upto 85 % during the 2nd half of 2016.There is an increasing trend in the import-price of broiler meat in Saudi Arabia. During the 2nd half of 2016, the import-price for broiler meat ranged between 6.4 to 6.6 SAR per kg, which was 6 % higher than in the 1st half of 2016. From January 2017, Saudi Government has increased the import duty on poultry meat from 5 % to 20 %, which, in turn, will increase the price of imported broiler meat up to 13-15 %. Saudi Arabia's total domestic broiler meat production in 2017 is forecast to increase by 4.47%, compared to the production in 2016. The total local broiler meat production in 2016 was 670,000 MT which was expected to be increased up to 700,000 MT in 2017.The main reason for the modest broiler production increase in 2016 and 2017 is the ongoing production expansion undertaken by the three largest Saudi poultry producers – Al-Watania Poultry, Fakieh Farmsand Almarai. On the other hand, the increase in the price of imported broiler meat due to the higher import duty will also help to boost the local production. The local producers have a great opportunity to fill the gap in supply created by higher import duty on broiler meat. Local companies can easily boost their production, and supply of fresh poultry meat on competitive price.Meanwhile on the export side, Saudi broiler meat exports for 2017 are expected to remain unchanged at 40,000 MT (as in 2015 and 2016) due to higher local demand. The export tax of $533 per MT, that the government levies as reimbursement for the various subsides that local broiler meat producers receive from the Saudi government, makes Saudi broiler meat less competitive abroad compared to other suppliers.

Keywords: *Broiler, Production, Saudi Arabia.*

THE EFFECT OF TEMPERATURE AND RELATIVE HUMIDITY ON POLLEN BEES ACTIVITY IN URBAN BEEKEEPING

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Abstract

Honey bee collects pollen which provides it with proteins, fats, mineral matters and vitamins. Lack of pollen in the nutrition of honey bee in spring slows down development of honey bee colonies. The activity of pollen bees and mass of collected pollen balls can both be considerably affected by climatic factors. In spring period in urban conditions on a bee-keeping apiary of the Faculty of Agriculture of the University of Belgrade (Serbia) we monitored activity of pollen bees in ten bee colonies. Counting the flights of pollen bees was done in the terms at 9 h, 11 h, 13 h, 15 h and 17 h and in 3 minutes individual intervals. Mass of pollen balls was measured for 6 foragers of each group in diurnal time terms. Temperature and relative humidity were recorded by means of data logger. Collected records were systematized and processed by standard statistical methods. The highest activity of pollen bees was at the temperature of 19^{o}C and relative air humidity of 47%. It was determined that with increasing the temperature by 1^{o}C an average number of pollen bees increases by 2.91. When relative humidity increases by one percent an average number of pollen bees increases by 1.95. At the increase of day temperature by 1^{o}C an average mass of pollen ball was larger by 0.258 mg ($P<0.05$). Research showed that climatic factors can significantly influence foraging activity of bees.

Keywords: *Apis mellifera, pollen bees, urban beekeeping.*

EVALUATION OF THE GENETIC IMPROVEMENT STUDIES IN LOW INPUT PRODUCTION SYSTEMS: AKKARAMAN SHEEP

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Abstract

The aim of this study was to evaluate the genetic improvement studies commenced in Konya, Turkey in 2006 within the context of national genetic improvement scheme for small ruminants in low input production systems. Study data was obtained with questionnaires completed through face-to-face interviews with all Akkaraman sheep breeders in the scheme along with the breeders out of the scheme equally in number. Akkaraman breeders were compared regarding twin births, lamb deaths, infertility and miscarriage rates, number of lambs per parturition, lamb live weights (LW) at birth and subsequent weighing dates, important breeding problems, diseases, internal and external parasites along with gross profit per production unit calculated for every breeder interviewed. Descriptive statistical methods and student t-tests for independent and paired samples were employed in analysis of the data. According to the results, it was found that Akkaraman flocks in the scheme were better regarding higher lamb LW increases, birth and twin birth rates, lower miscarriage and lamb death rates compared to the Akkaraman flocks out of the scheme. However, no significant difference was detected between the flocks in and out of the scheme regarding breeding problems and sheep diseases and pests. Regarding the economic achievement, it was calculated that Akkaraman sheep breeders of the scheme gained 105,6 more gross profit per production unit. It was also calculated that support payments paid in 2014 were 31,1 TRY per production unit. That is, the gross profit surplus (105,6 TRY) achieved as the result of the cumulative advancements since the beginning of the scheme in 2006 was more than 3,4 folds of the support payments paid in 2014. It was concluded that good results were cropped from the scheme but for the sustainability and higher achievements sheep diseases, pests and breeding problems should be tackled.

Keywords: *Genetic improvement, Akkaraman sheep, small holder low input systems, gross profit, Turkey.*

AN INVESTIGATION OF THE LANGUAGE REMOVAL RESPONSE (PER) METHOD OF WHETHER EARNINGS PRIORITIES OF HONEY BEES OF DIFFERENT AGES OCCUR

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Abstract

From the discovery of Pavlov's classical conditioning, the day-to-day method has been used in many organisms. By measuring the tongue reflexes (PER) without learning in honey bees, one of these organisms, the workers bees were conditioned in different subjects with many scientific studies. In this study, it is aimed to investigate whether the age of honey bees has effect on condition. Two rooms to be included in the study life of honey bees used in the experiment in accordance with the conditions have been settled. Honey bees have different physiological and behavioral characteristics at different ages. Considering the age of this 6 types (1-3, 4-6, 7-12, 13-17, 18-21, 22>) different age groups have been created. At the end of the experiment, it was observed that the honey bees remember conditioning. It was observed that 50% of the bees of all ages participating in the experiment were conditioned. Statistically an average of Conditioning trials obtained (±S. H.), an average minimum and maximum of the numbers of worker bees sartlanan most 793.00±4.00 22> ages was observed, while at least average if 543.67±3.84 daily have been observed in bees with ages of 18-21. There was a statistically significant difference between the age and the conditioning of honey bees and the recall of this condition in the statistical analysis ($P < 0.05$, sd: 5, F: 41.531). According to this, the learning groups were the ones with the highest learning, 1 group with older bears in the 22 days, 1-3 groups in the second group, honey group in the 4-6 day old group, 3 groups in 13-17 day old honey group, 4 groups in honey aged 7-12 days and 18-21 days old honeybees were 5 groups. As a result, honey bees were able to condition in all age groups, but honey bees of different age groups showed differences in conditions.

Key words: *honey bee, conditioning, age.*

GENERALIZED PROCRUSTES ANALYSIS: USE FOR SENSORY PANEL TESTS

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Abstract

Sensory panel tests are important methods to evaluate the sensory qualities of food. Additionally the use of appropriate statistical methods in evaluation of sensory panel test results is very important in terms of the reliability of test results. With the aim of assessing food products, the most common problem in sensory panel tests is the variability in assessments of the same food sample by different panelists. One of the most important variables is the lack of consensus among panelists in describing a sample. Leading the list of multivariate statistical techniques that account for this variability between panelists is the generalized procrustes analysis (GPA). In GPA, three different procrustes transformations (translation, isotropic scaling and rotation/reflection) are used with the aim of reducing the variability between panelists in the sensory test to a minimum. With these transformation processes, a matching process is applied to the different scores given by different panelists for the same sample and a reduction in variability is ensured. At the same time, the mean of each individual matrix obtained with the transformations is taken to create a consensus matrix and interpretations are made based on this matrix. With the aim of introducing the GPA method in this study, its application to a data set from a sensory panel is presented.

Keywords: *Procrustes Analysis, Panel test, Sensory data.*

DETERMINATION OF COSTS DURING MILKING AT THE DAIRY FARM MODELS

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Abstract

The study is conducted to determine machinery costs related to milking at dairy farms which contain various milking systems. For this purpose, milking systems at the farms have been considered for farm selection in a way that 3 pipeline milking systems-using, 3 bucket milking system-using and 3 mobile milking system-using dairy farms were selected. ISO compatibilities of the milking systems and machineries were examined and non-compliant were rendered compatible with ISO standarts. Costs studies estimations regarding milking process (before, during and after milking) were conducted and on this way the costs of the milking systems were calculated. As a result, pipeline milking systems were found to be 38,78% beneficial compared to bucket milking systems and 51,61% beneficial compared to mobile milking systems, in terms of yearly total machinery usage costs per cow values.

Keywords: *Milking machine, farm, milking, cost.*

FISH FAUNA OF GOYNUK STREAM IN BINGOL (TURKEY)

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Abstract

In this study, our aim was to determine the present status of fish fauna in Goynuk Stream (Bingol, Turkey). The fish were collected monthly for two years between May 2013 and December 2014 from previously determined 5 stations (Garip Village, Ilıcalar, Derinçay, Taşliçay, and Kale) in Goynuk Stream and its tributaries in Bingol. For this purpose, totally 1349 fish samples were caught by scoop net, electro-shocker and gill nets with different mesh sizes during the study period and their metric and meristic characters were measured to make species identification. The systematics (family, genus and species levels) of the fish caught from the research area are described by various scientists. In this study, 21 species belonging to 5 families were identified. It has been found that 14 species belong to Cyprinidae, 3 to Nemacheilidae, 1 to Cobitidae, 2 to Sisoridae and 1 to Mastacembelidae family. It is seen as the predominant family in terms of the number of species represented by the Cyprinidae family and the numbers of individuals belonging to these taxons. The Cyprinidae family is the most dominant family in terms of both the number of species (14 taxa) and the number of individuals belonging to these species (1057). Considering the entire Goynuk Stream and its tributaries, the species with the highest number of individuals were *Capoetaumbla*, *Capoetatrutta* and *Squaliscephalus*. It is seen that *Garraruffa* and *Cyprinionmacrostomus* speciesendemic to the Tigris and the Euphrates Rivers basin are more populous than Illıcalar Stream, which feeds Goynuk Stream.

Keywords: *The Goynuk Stream, fish fauna, freshwater fishes, taxonomy, Bingol, Turkey.*

CLASSIFICATION AND REGRESSION TREE ANALYSIS ON STILL BIRTH OF HAIR GOATS

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Abstract

Hair goat kidding deaths are an important problem in Turkey. Much of the deaths from birth to weaning time are due to management mistakes. Moreover goat age, parity, season of birth, birth type and sex etc. affect stillbirth of hair goats. This study aimed to determine the effects of goat age, parity, season of birth, birth type, sex, on still birth of hair goats in Turkey by Classification and Regression Tree method (CART). The CART is efficient data mining algorithms. This method predicts the value of a target variable based on the values of several input variables. Total 787 kids of 249 hair goat data records were used from 2014 to 2016. The goat age, parity, season of birth, birth type, sex were analyzed as independent variables and stillbirth was taken as dependent variables. Regression tree analyses showed that the most significant variable on stillbirth was parity. After that, season of birth and age of goat were secondary factors.

Keywords: *Stillbirth, Hair Goat, Data Mining, Regression tree.*

BEDDİNG MATERİAL USE İN DAİRY CATTLE BUSİNESS

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Abstract

Pasture areas influencing profitability significantly in cattle breeding are gradually diminishing. Reduced pasture areas lead farmers to intensive cattle breeding. In intensive breeding, the technique of setting up the barn is very important. It is an important influence on the ground, diseases and yields that are not considered during the building stage or are ignored by the thought that it would increase the cost. The effects of the selected bedding materials are seen in the future on the health and productivity of the animals. As is known, barn should not be on the edges of water sources and should be relatively high. Stables should not be built in a north-facing style. A part from this type of information, the floor must be serrated and slightly inclined backwards. On the stall grounds of the stables, mattress abodes which impact on the health and efficiency of the animals positively should be used. Bedding materials: a) affect comfort and welfare in the positive direction, b) reduce injuries by preventing slipping, c) Prevent injuries, d) encourage cows to lie down on the bed stand, e) provides better hygiene. Considering these factors, it is necessary to make the selection of suitable bedding materials in the enterprises.

Keywords: *Cow, Mattress, Bedding materials, Production, Welfare.*

EFFECT OF *STAT1, OLR1, CSN1S1, CSN1S2* AND *DGAT1* GENES ON MİLK YİELD AND QUALİTY TRAİTS İN HOLSTEİN BREED

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Abstract

The trend of improving dairy cattle breeding programmes has gradually changed from traditional phenotypical selection methods to genotypic selection by utilizing molecular markers. A number of candidate genes have been identified as potentially associated with milk yield and quality. Single nucleotide polymorphisms in the *signal transducer and activator of transcription* (*STAT1*), *oxidized low-density lipoprotein receptor* (*OLR1*), *alpha$_{S1}$-casein* (*CSN1S1*), *alpha$_{S2}$-casein* (*CSN1S2*) and *diacylglycerol acyltransferase 1* (*DGAT1*) genes have been shown to affect bovine milk production and composition traits in different cattle populations. Focusing on novel associations and characterization of genomic regions related to milk production traits is highly relevant for elucidating the influence of genetic markers commonly used on observed milk yield and quality. Therefore, the main objective of this study was to determine allele and genotype frequencies of the *STAT1*, *OLR1*, *CSN1S1*, *CSN1S2* and *DGAT1* genes and to evaluate their relation to milk production parameters. A total of 168 purebred Holstein heifers were selected randomly for the collection of genotype and the evaluation of phenotypic traits. In the present study lactation milk yield, 305 days milk yield, days before peak milk production and peak milk yield were recorded seperately. In addition, milk samples were analyzed monthly for fat, protein, lactose and total solid content with a milk analyzer. Genotypes of *STAT1*, *OLR1*, *CSN1S1*, *CSN1S2* and *DGAT1* genes were detected using a Polymerase Chain Reaction and Restriction Fragment Length Polymorphism method (PCR-RFLP). Statistical analyses were performed with the general linear model (GLM) procedure of Minitab. Statistically significant associations were as follows: *CSN1S2* with protein percentage, *STAT1* and *CSN1S1* with days before peak and *DGAT1* with peak milk yield. The present results could therefore be useful for future studies on milk production.

Keywords: *Gene marker, SNP, milk production, milk components, Holstein.*

EVALUATION OF NUTRITIVE VALUE OF SUNFLOWER (HELIANTHUS ANNUUS L.) LINES USING IN VITRO METHODS AND GAS PRODUCTION TECHNIQUE

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Abstract

This study was conducted to determine the nutritive value of Sunflower (*Helianthus annuus L.*) lines using in vitro methods and gas production technique. In vitro gas productions and gas production kinetics of sunflower (*Helianthus annuus L.*) lines were determined at 0, 3, 6, 12, 24, 48, 72 and 96 h incubation times. Five (DA-YR-13-48; DA-YR-13-44; DA-YR-13-259; DA-YR-13-12 and DA-YR- 13-18) lines of Sunflower were obtained from fields of East Mediterranean Agricultural Research Institute (36°51'18" North, 35°20'49" East). All lines were sown in randomized block desing with 4 replications and samples harvested from every blocks. Harvested samples were dried at 70 oC in an oven for 24 hours to find dry matter (DM) ratio. Sunflower (Helianthus annuus L.) lines samples were ground using a lab mill to pass a 1-mm screen. Standard methods as described in AOAC were used for determination of ash, ether extract, crude fibre and nitrogen (N) contents. Crude protein ratios were calculated using the equation of N x 6.25. The acid detergent fibre (ADF) and neutral detergent fibre (NDF) were determined. All chemical analyses were carried out in triplicate. Metabolizable energy (ME), net energy lactation (NEL) and organic matter digestibility (OMD) were calculated through in vitro gas production (GP) values for 24 h using different formulas. The in vitro gas production (GP) expressed as ml/200 mg DM and methane gas (CH4) at the end of the 24 hour incubation period of Sunflower lines were investigated too.

Keywords: *Sunflower lines, Chemical composition, Digestibility, In vitro gas production, Nutritive value.*

IMMUNOSTIMULANT EFFECTS OF OYSTER MUSHROOM (*PLEUROTUS OSTREATUS*) IN RAINBOW TROUT AND DISEASES RESISTANCE AGAINST *A. HYDROPHILA*

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Abstract

In the study, the immunostimulant effects of the methanolic extract of oyster mushroom (*Pleurotus ostreatus*) and disease resistance against *Aeromonas hydrophila* in rainbow trout (*O. mykiss*) were investigated. Three different concentrations of extracts (0 (Control), 0.1 and 0.5 g kg^{-1} of feed) were individually mixed with the basal diet and fed to rainbow trout to assess the immune modulatory characteristics of oyster mushroom. At the end of the study, rainbow trout was challenged with a strain of *A. hydrophila*. The study showed that oyster mushroom nitroblue tetrazolium (NBT) activity was found higher in all experimental groups compared to control. Phagocytic activity was also determined higher than control in all experimental groups. Lysozyme activity was higher in all experimental groups compared to control. Myeloperoxidase activity was investigated higher than control group, but among the experimental groups no differences were observed related to dosage. The study showed that the rainbow trout treated with 0.1 and 0.5 kg^{-1}oyster mushroom extract when challenged with live *A. hydrophila* showed no differences between control and oyster mushroom groups. According to study results, it can be saidthat oyster mushroom is an effective non-specific immunostimulant for rainbow trout.

Key Words: *Rainbow trout, Oyster mushroom, Immunostimulant, A. hydrophila.*

EFFECTS OF THE INCORPORATION OF BARLEY BREWERS AND LOCAL DEHYDRATED ORANGE PULP INTO THE RATION ON THE GROWTH OF BROILER CHICKENS (ALGERIA)

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Abstract

The rations of monogastrics, especially poultry, are mainly made up of soybean meal and maize, raw materials totally imported by Algeria. Their substitution by local raw materials or their co-products would be able to reduce the cost of production of animal products. It is within this framework that this study proposes to determine the effects of the incorporation of dehydrated citrus pulps at a fixed rate (5%) and dehydrated local barley grains partially substituting for corn, in the diet on the performance of growth of broiler chickens. A total of 200 one day old F15 broiler chickens was randomly divided into 4 equal groups according to the substitution rate of maize with brewers' grains (0%, 20%, 25% and 30%) for 48 days. No mortality was observed in any groups. The weight to 10 days were significantly greater for lots 20%(+19%) and 30% (+11%), while for the weight to 20 days, only the lot 20% has a weight significantly greater with 578g. In the growth phase, the weight of the control and the 30% batch are similar. In the finishing phase, the control batches, 25 and 30% have similar weights (2600g). The Consumption Index and intake quantities change proportionally to substitution rates, while costs are inversely proportional. The prices of the kilograms of live weight and eviscerated carcass of lots 20 and 25% are promising with less than 8 and 12 DZA respectively. The incorporation of 5% citrus pulp and 30% dehydrated barley grains, in substitution for maize, alters consumption and intake rates but produces significant economic results for their uses in chicken dietary formulas.

Keywords: *Weight growth, Brewery dreches, consumption index, Corn, Citrus pulp.*

EFFECT OF CORTISOL LEVEL AND HAIR CHARACTERISTICS ON FERTILITY OF DAIRY COWS IN ALGERIA

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Abstract

Understanding responses of dairy cows to the effect of hot climate is essential to select more resilient animals. Our study investigated the relationship between hair cortisol level, hair and coat characteristics and fertility of 28 Fleckvieh and 67 Montbéliarde cows during hot and cold season in a commercial farm. Cows were maintained indoors with summer grazing. The following characteristics of hair and coat have been measured : hair cortisol level (C), Hair Weight (W), hair length (L); number of hairs per unit area (N), total hair diameter (HD), hair medullar diameter (MD) and percentage of white coat color (C%). Fertility parameters were estimated: interval from calving to first service (ICS), insemination per conception (IPC), and interval from calving to conception (IC). Statistical analysis was carried using Pearson correlation and Spearman's correlation rank when variables were not normally distributed with the SPSS package program, version 21. In Montbéliarde breed, hair total diameter was negatively correlated with IPC ($r = - 0.338$, $p=0.01$) in winter indicating that Montbéliarde cows, with large total hair diameter, required reduced number of IPC to be pregnant, while in summer hair coat traits were not correlated with all fertility parameters. Positive correlations were observed between cows' hair coat characteristics and fertility parameters during Summer. In Montbéliarde breed, hair coat traits were not correlated with all fertility parameters. In Fleckvieh cows, coat color was significantly correlated with ICS and IC ($r=0.674$, $p=0.02$; $r=0.596$, $p=0.04$, respectively) during Summer. No association between hair cortisol level and fertility was observed. Proportion of white color in Fleckvieh cows significantly affected fertility. These results indicate that reproductive efficiency parameters are related to coat characteristics; this association was more expressed in Fluckvieh than in Montbéliarde breed. Also, possibility exists to select more adapted animals to warm climate regions.

Keywords: *Fertility, hair coat, cortisol, hot season, cows, Algeria.*

THE EFFECT OF ESTRUS SYNCHRONIZATION ON SHEEP FERTILITY AND FATTENING

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Abstract

The main goal of this paper was to experimentally determine the effect of estrus synchronization on the percentage of fertility and fattening performance of lambs in a specific period. The percentage of fertility in sheep synchronization was 74% and 100% in the control group. 53.83% of male and 46.15% of female lambs were obtained. The average body weight of all lambs at birth was 3.48 kg, and the differences between the groups were not statistically significant ($P > 0.05$), it was 11.29 kg in 30 days of age and 20.64 kg for 90 days old lambs. Differences in lambs weight between gender and type of birth are very significant ($P < 0.001$), while among the groups they are not statistically significant ($P < 0.01$). The average daily growth of lambs in fattening 6 to 8 months old was 180g, and the estrus synchronization did not have any effect on the production traits.

Key words: *sheep, estrus synchronization, fertility, fattening.*

GENETIC PARAMETERS OF CLAW CONFORMATION IN SLOVAK HOLSTEIN COWS

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Abstract

The estimation of heritability of claw measures is needed for implementation of selection indexes, which are used in many European countries in breeding for better claw health and conformation traits. The aim of this study was to estimate the heritability of claw parameters (claw angle, claw length, heel index, claw height, diagonal and claw width were taken after functional claw trimming on lateral side of right hind leg) in Holstein cows in Slovakia. The analysis was based on 482 observations taken from 439 Holstein cows measured between 2012 and 2014 on three farms. On transformed measurements we used animal model with fixed effects as number of lactation, stage of lactation, year of calving, season of calving, year of trimming, season of trimming and sire. Heritability of claw parameters ranged from 0.01 to 0.26. Highest heritability estimate were observed in claw length and claw height. In case of claw angle the heritability was 0.14 and claw width was 0.13. Heritability of heel depth was not estimable. One of possible causes could be small number of observations. Our results are preliminary and further research with higher number of observations and animals is required to obtain more reliable estimates.

Key words: *Holstein, cow, heritability, claw measure, animal model.*

EFFECTS OF DIFFERENT GROWING PARAMETERS ON THE GROWTH PARAMETERS OF THE YOUNG GILTHEAD SEA BREAM (*SPARUS AURATA*)

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Abstract

The gilthead sea bream is a large demanding marine fish which is popular in Turkey and other Mediterranean countries. After the European sea bass, it is the second most cultured species in Turkey with a well-designed protocol of growing. Nevertheless, as a result of high product necessities, high stock density and feeding with high energy dense diets, fish liver accumulates lipid droplets that can cause fatty liver. On the other hand skeleton deformations are very significant biological problem in finfish hatcheries affected by various biotic and abiotic factors and affect 5-20% on average of the young fish. In this sense, in this study, the researchers compared the effects of different tank shapes (38 tons raceway and 130 tons cylindrical) and two differently formulated diets on the liver histology and external morphology of the gilthead sea bream with two repetitions. At the beginning, the fish were separated into two groups; the Group A (38 t raceway and 130 t cylindrical) was lasted for 27 days and comprised 2.149,487 fish and the Group B (38 t raceway and 130 t cylindrical) lasted for 29 days and comprised 2.193,689 fish. At the end of the study, there was no statistically difference of biomass between the two groups ($p>0.05$). The Group A was weighed 3,474 kg and the Group B weighed 3,511 kg. Survival rates were 93% for the both groups. The last weight of the Group A was 1,733 gr and the Group B was 1,709 ($p>0.05$). FCR were calculated 1.13 and 1.05; SGR were 3.47 and 3.91, skeleton deformations were 0.19% and 0.18% at the beginning of the study, 0.14% and 0.13% at the end of the study, respectively. The deformations were mostly found on the vertebrae, less on head, jaw and mouth. In histological results, during the study in the Group A all fish showed moderately fatty liver and in the Group B 50% of the livers were moderately fatty and rest 50% were fatty.

Key words: *Gilthead sea bream, Sparus aurata, Histology, Liver, Growth.*

DETECTION OF RESIDUE OF ANTIBIOTICS (OXYTETRACYCLINE) IN EGGS BY TWOMICROBIOLOGICALMETHODS: DIFFUSION ON AGAR WITH TEST STRAIN *BACILLUS CEREUS* AND THE REFERENCEMETHOD (*STAPHYLOCOCCUS, PSEUDOMONAS, E.COLI* AND *KLEBSIELLA)*

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Abstract

The aim of our study is the detection of residues of antibiotic substances in some table eggs by two microbiological methods called agar diffusion test. A sample of 30 eggs collected from different outlets in the city of Bougara w- Blida was collected and tested to detect the presence or absence of antibiotic residues. In the first method, we look for residues of oxytetracycline (OTC) (an antibiotic widely used by poultry farmers) using a test strain: *Bacillus cereus*. The number of analyzed sample was 10. In the second method, we try to detect the presence of a few families of antibiotics in a sample of 10 eggs with 4 bacterial strains reference which are: *Staphylococcus aureus* ATCC 25923 sensitive to tetracycline and erythromycin, *Pseudomonasaerugenosa* ATCC 27853 sensitive to colistine, *E. coli* ATCC 25922 and *Klebsiella pneumoniae* sensitive to tetracycline and colistine. In both trials, eggs from treated hen with OTC served as a positive control to which our results are referred, and egg from untreated hen served as a negative control. The results obtained in both tests were the absence of antibiotic residues in 30 eggs tested. No inhibition zone was detected in the samples and the negative controls, while the positive controls showed an inhibition of growth of bacterial cultures sensitive to OTC namely *B.cereus, S. aureus and E. coli* resulting in the appearance of clear zones of inhibition and well formed around the discs soaked in the positive control samples, because of their countenance in OTC residues.

Keywords: *antibiotics, eggs, oxytetracycline, antibiotique residues, inhibition zone*.

THE EVALUATION OF ORGANOLEPTIC PARAMETERS OF RABBIT MEAT, ASA NOTABLE WAY TO PROMOTE RABBIT MEAT CONSUMPTION

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Abstract

A total of 100 carcasses of male rabbits of the high Algeria locals in the Aures region were subjected to a chemical test and a sensory test. The weight characteristics of fattening rabbits from weaning (28 days after birth) were determined. The distributed food contained 13.3% crude fiber, 16.8% crude protein and 2.5% fat. The growth rate was 32.3 ± 3.5 g/d. The rabbits were slaughtered at 11 weeks of age with live weight of 2000 means ± 483g. The yields of carcass, back and loin was 55 ± 13.1%, 24.3 ± 3.1%, and 29.7 ± 3.5, respectively. The chemical composition of the meat showed 22.63% protein and 1.45% fat. The samples (back and loin) were baked in an oven. During sensory testing, the panelists indicated that the meat from the local rabbits was very tender (6.6/7), very juicy (2.39/5) but more mealy (3.65/7) with an intense flavor (5.89/7).

Keywords: *rabbit buck, chemical composition, meat, sensory analysis.*

EFFECT OF HERBAL SUPPLEMENTATION TO TMR DIET ON LIPID PROFILE OF BLOOD AND MEAT IN SHEEP

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Abstract

An experiment was conducted to investigate the effect of a medicinal herb plantain (*Plantago lanceolata* L.) supplementation on growth performance and carcass characteristics in sheep. For this experiment 12 indigenous one-year old Garole sheep (*Ovis aries*) around 9±0.7 kg of live weight (LW) were randomly divided into two groups using Randomized Block Design. One group was supplied roadside grass, wheat bran, molasses based total mixed ration (TMR) pellet (ME=2240 kcal/kg dry matter, CP=14.21%) which was considered as control diet (TMRP-diet). In another group the TMRP-diet was supplemented with 5% plantain (*Plantago lanceolata* L.) herb that was termed as TMRPPL-diet. In both the dietary treatments the energy and protein were offered at 1.5 times of the maintenance level for a period of 90 days. The LW was recorded at the onset of the experimental period and then every week throughout it. . The LW gain, and total digestible nutrients were higher (P<0.05), and the feed conversion ratio was significantly lower (P<0.05) in TMRPPL-diet compared to TMRP-diet. Plasma glucose and triglycerides concentration, and caul fat and pelvic fat were significantly lower (P<0.05) in sheep fed TMRPPL-diet compared to the sheep fed TMRP-diet. It could be concluded that supplementation of plantain herb might be used as additive in Garole sheep diet for better growth performance and lean meat production.

Keywords: *plantain, sheep, TMR pellet, lipid profile, meat characteristic*.

CARCASS QUALITY AND MEAT CHEMICAL COMPOSITION IN TWO LINES OF SLOW GROWING CHICKENS AND THEIR CROSSES

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Abstract

The study was carried out to compare the carcass characteristics and meat chemical composition in two lines of slow growing male chickens - La Belle (LB) and Bresse (BB), and their crosses (♂LB x ♀BB, ♂BB x ♀LB). All the birds were reared indoors in the same conditions and at the age of 12 weeks, 6 chickens of each line were selected for slaughter. One-way ANOVA was performed to assess the differences in the carcass and meat quality among lines. The results showed that crossing of LB and BB lines affected the live weight and the weight of the eviscerated carcass ($P<0.001$), edible by-products - neck and giblets ($P<0.05$), and non edible parts ($P<0.01$). The highest values of these parameters were observed in ♂BB x ♀LB birds. This crossbred line had the highest weight of back and wings, while the lowest weight of thighs was observed in BB chickens. Furthermore, ♂LB x ♀BB birds tended to have higher dressing percentage ($P=0.08$), but the lowest content of edible by-products among all lines ($P<0.05$). Crossing also influenced the chemical composition of the breast ($P<0.001$), leading to higher protein but lower moisture content in both crosses. In thighs the content of lipids and protein differed significantly between the crossbred lines as ♂BB x ♀LB had higher lipid but lower protein when compared to the ♂LB x ♀BB chickens ($P<0.05$) The ash had the highest content in breast of BB birds and the thighs of LB and ♂LB x ♀BB chickens.

Keywords: *Slow growing chickens, Pure lines, Crossbred lines, Carcass traits, Meat quality.*

CONSUMER ACCEPTABILITY OF A COSMETIC FACE CREAM MANUFACTURED BY ADDING DONKEY MILK

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Abstract

There is an increasing demand for natural products on the cosmetic market. Donkey milk are rich in whey proteins, vitamins and minerals, lactose, free amino acids and lipids documented to be beneficial for skin. We studied the perception of untrained subjects towards sensory aspects of a face cream manifactured with asinine milk. For consumer testing, 70 randomly recruited women evaluated two face creams with the same formulation, but with/without asinine milk, by applying cosmetics every evening at home. After 7 and 15 days, some sensory aspects were evaluated. ANOVA put in evidence the effect of cosmetic and of skin type on judgment. Creams for both periods reached a good score for most of parameters. Moisturization and smoothness of skin was significantly highest at 7 and at 15 day for treated cream in dry skin consumers. This preliminary study suggests that donkey milk can effort properties of hydrating, attenuating and protecting the skin.

Keywords: *Face cream, Donkey milk, Consumer, Natural ingredient.*

BIOCHEMICAL COMPOSITIONS OF RUMEN CONTENT FRACTIONS FROM SLAUGHTER CATTLE IN NORTH-CENTRAL NIGERIA

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Abstract

Abattoir wastes are major contributors to urban waste generation in Nigeria. Some of these wastes such as rumen digesta (RD) could serve as poultry feed raw material when properly processed. However, since nutrient content of RD is influenced by seasonal variations in feed types, there is the need to establish reference values needed for their use in poultry feeds formulation. This study determined the rainy season nutrient compositions of RD from Gwagwalada abattoir in Abuja, north-central Nigeria. Approximately 1Kg each of reticulo-rumen (RR), omasum (OM), and abomasum (AB) contents of slaughtered cattle were collected from the abattoir in August 2015. The RR contents were further separated into their intact (IRC), liquid (LRC) and solid (SRC) components before subjection to proximate, calorific value, calcium and phosphorus analysis. The dry matter (DM) contents of RR, OM and AB digestas were 11.29, 19.41 and 8.49%, respectively. Generally, the IRC was rich in crude protein (CP, 18.30±0.61%), total carbohydrate (TC, 65.24±1.41%), nitrogen free extract (NFE, 39.40±6.10%) and calorific value (CV, 384.15±6.10 kg/100g). LRC recorded significantly higher CP, ether extract and CV, and lower DM, crude fiber, TC and NFE values than IRC and SRC ($p<0.05$). Similarly, the LRC recorded significantly higher calcium, phosphorus and nitrogen values than the other RD fractions ($p<0.05$), indicating that removal of digesta fluid will lead to significant alterations in RD nutrient values. Therefore, during processing, there is the need to retain the nutrients in the liquid fraction of rumen digesta in order not to compromise its overall nutrient value.

Keywords: *Abattoir, cattle, rumen digesta, poultry feeds.*

CRYO-PROTECTIVE EFFECTS OF NATURAL HONEY ON SPERMATOZOA QUALITY OF EXTENDED BOAR SEMEN

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Abstract

Glycerol, which has been used for cryopreservation of boar semen over the years, has been reported to be detrimental at >3% on the spermatozoa quality. This initiated the evaluation of a replacement of cryo-protectant with a natural source using an unconventional technique. Natural honey is a mixture of a wide variety of components that confer synergistic anti-oxidative effect on mammalian cells. Semen from a proven boar was extendedusing Beltsville Thawing Solution containing 2% glycerol replaced with honey at graded levels (0,25,50,75 and 100%) forming five treatments respectively andfrozen at-30°C for 48 hours. Treatment1 (control) had glycerol as the only cryo-protectant used. The five treatments replicated three times were evaluated for pH, motility, percentage live-dead and morphology. Data were analysed using Analysis of Variance.The pH was not significantly different ($P>0.05$) throughout. Although motility was reported to be not significantly different ($P>0.05$) among the treatments at 0hour, Treatment5(33.33±5.77) was significantly higher ($P<0.05$) while Treatment1(16.67±5.77) was significantly lower ($P<0.05$) than other treatments after 48 hours. Treatment 5 also showed the highest numerical value of percentage live (79.88%) and lowest value of percentage dead spermatozoa (20.12%) at 0 hour with no significant difference ($P<0.05$) among the treatments. Morphology in Treatment5(90%) had the highest numerical value after 48 hours also with no significant difference among the treatments ($P>0.05$). In conclusion, the results show that honey is a promising ingredient in the preservation of boar semen andits optimum inclusion level in frozen extended boar semen, from this study, is at 100%.

Keywords: *Boar Semen, Cryopreservation, Glycerol and Natural Honey.*

PREVALENCE OF DANGEROUS ZOONOSES AMONG WILD CARNIVORES AND FUR ANIMALS OF CAGE MANAGEMENT IN SOME REGIONS OF THE RUSSIAN FEDERATION

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Abstract

The rates of infection among wild carnivores in the Kabarbino-Balkarian Republic and fur animals of cage management in the Kirov Region (Russia) were investigated. Echinococcus granulosus and Toxocara canis infections appeared to be the most common helminthoses among wild carnivores. In Kabardino-Balkaria, the number of wolves infected by E. granuloses and T. canis increased from 28.6 to 78.6% (on average 54%), jackals – from 26.9 to 88.5% (58.5%), raccoon dogs – from 18.2 to 81.8% (51.0%), foxes – from 13.3 to 73,3% (45.3%). The comparative analysis of the infection rates with E. granulosus and T. canis in different age groups of wild carnivores was carried out. The highest level of infection was revealed in adult animals. The values of infection extensity in wolves increased from 7.1 to 21.4% (on average 7.1%); in jackals – from 7.7 to 27.0% (4.7%); in raccoon dogs – from 9.1 to 18.2% (10.9%) and in foxes – from 6.7 to 20.0% (18.7%) though for the trial period. The obtained data evidenced about existence of E. granulosus and T. canis infection stable natural foci supported by high levels of infection in wild carnivores. It caused a dangerous epizootic situation on these helminthoses. The investigation of caged fur animals was carried out in the Kirov Region before planned dehelminthizations. It was found that helminthoses caused by Toxocara canis and Toxascaris leonine were the most common ones. At fur farms of the region, during the study period the number of polar foxes infected by T. canis increased from 53.34% to 74.0%; of raccoon dogs – from 65.0 to 87.5%. The level of T. leonina infection among polar foxes increased from 43.34 to 52.0% and in raccoon dogs reached 75.0% during the same period. On the basis of the obtained results we can conclude that dehelminthizations are necessary for fur animals of cage management.

Keywords: *Echinococcus granulosus, Toxocara canis, Toxascaris leonine, infection.*

BOTHRIOCEPHALUS SPP. INFECTION OF CYPRINIDAE: EPIZOOTOLOGY, CLINICAL FEATURES AND PATHOGENESIS, DIAGNOSTICS, THERAPEUTIC AND PROPHYLACTIC MEASURES

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Abstract

Bothriocephalosis of fish is a disease caused by tape worms Bothriocephalus opsariichthydis and Bothriocephalus acheilognathi parasitizing in the anterior part of intestine. Bothriocephalus spp. infection is widely spread among fish at pond farms, cage fish farms in cooling ponds of thermal power and nuclear power stations and in natural reservoirs. One has revealed Bothriocephalus in 26 species of fish attributed to Cyprinidae family, in salmons (Arctic salmon) and in some predatory fish (catfish, pikeperch). Different species of cyclopes serve as the intermediate hosts necessary for development of helminths. Fish fry and fingerlings are the most susceptible ones to infection. Fish of older age groups are less susceptible to this parasite. The data on biology, epizootology, clinical features and pathogenesis, diagnostics, therapeutic and prophylactic measures against this infection are represented. The results of the field trials with microsal against Bothriocephalosis in carps and grass carps carried out in different regions of the Russian Federation as well as monitoring of the safe use of microsal for the study period (2007 to 2016) are described. The daily dose of medicated feed with 2% of microsal corresponds to the daily feeding for fish. The therapeutic feeding is carried out during one day without preliminary starvation period according to the current technology of fish feeding with granulated feed. The dose level according to the active substance depends on water temperature and average fish weight and ranges 12 to 40 mg/kg. Prophylactic treatment is carried out twice a year: in late April – early May and in late August – early September (at pond farms) and in late September – early October (at cage fish farms) when the water temperature is not higher 150 C. In general the data obtained for 10 year period evidence about microsal's safety for fish and at its current application (according to the instructions) the reasonable benefit/risk ratio is maintained in all cases.

Keywords*: Bothriocephalus opsariichthydis, Bothriocephalus acheilognathi, fish farms, microsal.*

INCREASING MILK SOMATIC CELL COUNT IN DAIRY COWS DEFICIT WITH HEAVY METAL SELENIUM

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Abstract

The aim of this study was to determine the increasing milk somatic cell count in dairy cows with deficit of selenium as one important heavy metal. The experiment included 30 high-yielding Holstein-Friesian cows. Selenium concentrations in blood and milk serum, and the average somatic cell count in the first and sixth months of lactation were analyzed. The mean selenium concentration in the blood serum was 0.62±0.11 mmol/L and that in the milk serum was 0.12±0.07 mmol/L. Optimal blood levels of selenium were found in 19 cows and suboptimal levels in 11 cows. A significant negative correlation was observed between blood and milk selenium concentrations and somatic cell count in early and mid lactation. There was no relationship between blood selenium concentration, milk selenium concentration and the amount of milk produced. Selenium-deficient cows had a significantly higher milk somatic cell count in early and mid lactation and significantly lower levels of selenium in milk. Results showed that selenium has a significant impact on udder health. Changes caused by selenium deficiency occur due to marked inflammation process in the mammary gland.

Keywords: *selenium, heavy metal, somatic cell count, dairy cows.*

EFFECT OF USING TRITICALE IN FEEDON PERFORMANCE OF BROILER CHICKS

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Abstract

This study was conducted to investigate the effect of using triticale on the growth performance, production and slaughter characteristics of broiler chicks. The research was carried out on 400 feeding chickens, hybrid Ross 308. The first diet was the standard starter, grower I, grower II and finisher and served as the control. The other rations contained 7.5%, 12%, 15% and 18% triticale as graded replacement for maize and wheat. The experiment lasted eating chicken 42 days. Based on the recorded productive traits of the examined groups of chicks the researchers came to a conclusion that the best results for mortality, feed conversion, production index, average body weight before butchery, handled and cooled carcass weight after 42 days of age are achieved by the Group C . The average live body weight on the 42nd day of fattening was the highest in the experimental groups C and D (2054.50 g and 1984.00 g), which is by 5.09% and 1.71% higher than the body weight of the broiler chicks in the Group A. Insignificantly higher values for all three dressing yields ("conventional processing", "ready to roast" and "ready to grill") were found in the Group C, with the addition of the triticale Favorit (83.18%, 77.73% and 71.20%).

Key words: *broiler chickens, growth, feeding, triticale.*

POLYMORPHISMS IN CANDIDATE GENES FOR BEEF QUALITY IN PINZGAU CATTLE

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Abstract

The aim of present study was to identify the polymorphisms in genes encoding calpastatin (CASTUoG), calpain (CAPN1, CAPN2), diacylglycerol O-acyltransferase (DGAT1), thyroglobulin (TG5), and Stearoyl-CoA Desaturase (SCD) in order to analyze genetic structure of Pinzgau cattle. The genomic DNA for genotyping was obtained from in total 56 blood samples of Pinzgau bulls. After extraction, the concentration of DNA was controlled by the spectrophotometry measurement. The genotyping of each individual was carried out by using PCR-RFLP methods. The average value of observed (0.37±0.05) and expected heterozygosity (0.39±0.06) clearly indicated the prevalence of homozygous individuals. Observed Wright's fixation indexes showed positive values across all loci (0.03±0.06), which confirmed slight deficiency of heterozygote animals compared to the Hardy-Weinberg equilibrium expectations. The Hardy-Weinberg equilibrium was found in population ,which signalizes only slight impact of factors such as selection, migration or inbreeding. The effectiveness of loci allele impact in populations has been described also by effective allele numbers (1.68±0.13) that expressed the decrease of allele activity in population. The loss of heterozygosity in analysed population was found across all of genetic markers. Each of the evaluated indicators clearly points to the need of genetic diversity monitoring. Moreover, the analyses of single nucleotide polymorphisms in genes significantly involved in control of economically important production traits are still very usable methods for identification of genetic markers that can be used in marker assisted selection of cattle.

Keywords: *cattle, genetic markers, meat quality, SNPs genotyping.*

GENETIC IMPROVEMENT OF CATTLE THROUGH LOW DENSITY SNP PANELS

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Abstract

The aim of this study was to prepare a low cost custom genotyping panel to service all of requirements for cattle breeders. Our study presents the panel of SNPs mainly with respect to the needs of Pinzgau cattle breeders in Slovakia. Overall 152 animals, representing the genepool of active Slovak Pinzgau population, have been genotyped with Illumina bovine SNP50 BeadChip. The quality control of data was carried out to remove any markers assigned to unmapped regions, SNPs with unknown chromosomal position and loci positioned to sex chromosomes. The following control of genotyping data were performed to exclude any autosomal loci with call rate lower than 90%, minor allele frequency lower than 0.05 and HWE limit of 0.0001. The final dataset was composed of 41,720 autosomal loci covering overall length 2,500,315 kb of the genome. To produce the low density panel only SNPs located in the regions near genes significantly associated with dairy production according to the previously published studies have been selected. Subsequently, the genetic potential of analysed animals was evaluated in order to fulfil farmers' requirements and also in broader sense to achieve the genetic improvement of breed. Despite the fact that the high density SNP arrays are currently utilized for many purposes, the challenge for the cattle industry still remains to successfully present and implement this technology to the common practice on farms. One of the ways how to do this is to prepare low cost custom genotyping panel in view of farmers' requirements.

Keywords: *breeding program, bovine SNP panel, dual-purpose breeds, Pinzgau cattle.*

USE OF SECONDARY METABOLITES IN MEDICAL AND AROMATIC PLANTS IN ANIMAL NUTRITION

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Abstract

Secondary metabolites are produced biosynthetically from primary metabolites and are restricted to a taxonomic group (species, genera, family) whose distribution in plants is special. Although the herbicidal roles of the sequestered products differ, those cytotoxic to microbial pathogens are used as antimicrobial agents. The effects against herbivors are neurotoxic on the central nervous system and are utilized as "anti-depressant", sedative, muscle relaxant or anesthetic drugs, and because some of them are structurally similar to ligands, hormones, signal transduction molecules or neurotransmitters, they are used to obtain effective drugs against the system. For example, it has been suggested that Taraxacum officinale leaf extract has an anti-inflammatory effect on the central nervous system. These results indicate that the reduction of nutrient intake is avoided without being poisoned more than the inhibition of protein-carbohydrate digestion. The management of the pastureland and wildlife habitat requires an understanding of the factors that affect the quality of herbivorous herbage. Herbaceous quality is generally considered equal to the digestibility of food or energy. Thus, attempts to understand the chemical basis of herbaceous quality have focused on the measurement of concentrations of fiber or nutrients. When secondary metabolites are taken into account, the most important consideration is their potential to inhibit digestion. Despite the recognition of these modes of action of secondary metabolites, less attention has been paid to nutrition deterrence and toxicity. In this review, the importance of important compounds found in medical and aromatic plants has been examined in terms of animal nutrition.

Keywords: *Secondary metabolites, animal feeding, medical and aromatik plants.*

PROLONGED LAYING PERIOD AND KEEL BONE DAMAGES IN LAYER CHICKENS

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Abstract

Killing male chicks, injurious pecking, keel bone damages and short production period are the main problems expected to solve to improve layer welfare in table egg production. Prolonged use of layer with molting is very common in some countries and it can be an alternate to overcome the short laying period and poor welfare. If layers are molted and used during two or three laying cycles instead of one, there are less layers to be killed and discarded per year. Egg and bone quality as well as egg production naturally decrease in older layers. After an unproductive period, these problems can be substantially reduced. In the past, molting has been banned for animal welfare reasons in most countries. However, "animal friendly" molting systems without complete feed, water and light deprivation have recently been developed. Keel bone damages including deviations of the bone and fractures are very common in laying hens, especially in non-cage housing systems. It increases with age and present a major risk to the well-being of the poultry. The expected effects of prolonged use of laying hens on keel bone damages may be more important, therefore it should be investigated. This study was planned to investigate the presence of keel bone damages in moulted layer chickens.

Key words*: Prolonged laying period, keel bone damages.*

INVESTIGATION OF RELATIONSHIPS BETWEEN SOME CHARACTERISTICS OF HAIR GOATS BY CANONICAL CORRELATION ANALYSIS

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Abstract

In goat breeding, several traits can be explained not by the single variable, but by the possible connection of the common several dependent or independent variables. For this purpose, the mentioned variables must be taken together and defined multi-dimensionally. In this study, the relationships of herd, year of birth, birth type, sex, weight at birth, weight at thirty day of age and weight at weaning age effects of Turkish Hair Goats were investigated by canonic correlation analysis. The data were utilized from 1020 male and 1011 female Hair goat kids which were born in the period from 2013to 2016. The herd, year of birth, birth type and sex were analyzed as first set of variables (X); weight at birth, weight at thirty day of age and weight at weaning age effects were analyzed as second set of variables (Y). By performing canonical correlation analysis, canonical correlations between the first, second and third pair of canonical variates were estimated and three canonical correlation were found significant ($P < 0.01$). The biggest correlations between year of birth, sex, birth type variables and v1, v2 and v3 canonical variates were found -0.77%, 0.87% and -0.82%, respectively. The biggest correlations between weight at birth, weight at thirty day of age and weight at weaning age and w1, w2 and w3 canonical variates were found 0.84%, -0.97% and -0.78%, respectively. As a result, it has been determined that sex and birth type plays an important role in the formation of the goat kid's body weights.

Keywords: *Hair Goat, Canonic correlation, Body weight.*

INTER- AND INTRASPECIFIC VARIATION OF MORPHOLOGICAL CHARACTERS OF STERLET STURGEON (*ACIPENSER RUTHENUS*), RUSSIAN STURGEON (*ACIPENSER GUELDENSTAEDTII*) AND THEIR HYBRID

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Abstract

In recent decades, sturgeon populations have declined drastically, many species becoming threatened with extinction, aspect which generates the interest of aquaculture farmers in crossbreeding and growing them under controlled conditions. Lately, the production of sturgeon hybrids under artificial aquaculture conditions has increased, being noticed that some hybrids have a very fast growth rate. The aim of the study was to compare some morphometric characters of sterlet (*Acipenser ruthenus*) and Russian sturgeon (*Acipenser gueldenstaedtii*) with those of hybrid sturgeons obtained by crossbreeding of Acipenser *gueldenstaedtii* x *Acipenser ruthenus* and to assess intraspecific and interspecific phenotypic variation. The fish were artificially obtained at Horia sturgeon station, located in Tulcea County in the year 2016. Following biometric measurements were made, including weight (W), total length (TL), standard length (SL), fork length (FL), maximum body depth (last depth of caudal peduncle, H); preanal distance (AD), predorsal distance (PD), length of head (C), preorbital distance (PO), length of pectoral fin (LPF), interorbital distance (ID), maximum width of head (MH), width of mouth (WM), width of the head at the level of the mouth (WHM). In order to highlight more eloquent the differences, mathematical equations relating to the relationships among different morphometric traits were developed. These relationships may serve as a useful methodology to supplement analytical studies on morphometrics in Acipenseridae.

Keywords: *Sterlet sturgeon, Russian sturgeon, hybrid sturgeon, morphological characters.*

Acknowledgements

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DISTRIBUTION OF FUNGI ON CORN COB STORED IN BARNS ON TERRITORIES OF MUNICIPALITIES VRNJACKA BANJA AND KRUSEVAC IN SERBIA

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Abstract

During research done on corn in barns on territories of municipalities Vrnjacka Banja and Krusevac we isolated following sorts of molds with following line of appearance: Penicillium sp. 54,16%, Aspergillus ustus 51,67%, Alternaria tenuis 45,00%, Kvacnice 38,33%, Mucor mucedo 25,00%, Fusarium roseum 22,50%, Aspergillus candidus 20,10%, Trichoderma viride 16,77%, Aspergillus flavus 11,67%, Aspergillus restrictus 7,50%, Asoergillus sp. and Scopulariopsis brevicans 2,50% each, Aspergillus niger 1,67% and Rhisopus rhisoides 0,83%. Penicillium finding represents foundation for storage molds in our conditions. Dominant role was frequently represented by molds from the genus Alternaria and Fusarium, most common of storage molds were molds from the genus Aspergillus and Penicillium, and most common progressive decay molds were Mucor and Rhisopos. Infection of grain showing high level of contamination, by rule 100%.

Keywords*: molds, corn, infection of grain.*

CHANGES IN LIGHT INTENSITY AND DURATION EMITTED FROM LED DURING INCUBATION CAN INFLUENCE HATCHABILITY AND SOME ORGAN DEVELOPMENTS OF CHICKS IN JAPANESE QUAIL (COTURNIX COTURNIX JAPONICA)

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Abstract

This experiment evaluated the effects of lighting during embryogenesis on hatchability, supply organ weights at hatch, and eye developments of chicks in Japanese quail (*Coturnix coturnix japonica*). A total of 592 fresh eggs were randomly divided into 4 groups. The quail eggs (n= 592) were incubated 0L+24D (C) , 6L+18D at 3500lx (A), 24L+0D at 3500 lx (B), 24L+0D at 300 lx (D). There were found no significant differences among groups for hatchability, early, mid and late term embryo deaths. On the other hand there was an effect of incubation lighting regimen on some organ weights. Yolk sac weighs as percentage of whole body weight were heavier in C group (11, 26 %, $P<0.05$) than B and D groups. However, liver weight were higher in group B (2.68 %, $P<0.05$) than C and A groups. However, no significant differenceswere found in chick weights (g), yolk free chick weights (g) and heart weights (%) among treatments groups. There were found no significant differences for time of hatch among groups $(P>0.05)$. These results demonstrates that 24 h light at 3500 lx light level (group B) and 24 h light at 3000 lx light level (group D) the days between 2-14 of incubation can impact some organ weighs

Key words: *quail, incubation, light, eye development.*

ACETAMEPRID TOXICITY ON LIVER STRUCTURE IN MALE ALBINO MICE

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Abstract

The research for pesticide toxicity on non-target mammals has been the subject of many studies. Neonicotinoids, including acetamiprid are among the most widely used insecticides worldwide since 1991on several agricultural crops. The main aim of this work is to study the short-term toxicity of acetamiprid on mice liver structure which is the major site of metabolism including detoxification. Eighteen adult male albino mice were divided into three groups, group 1 was kept as control, Which is administered orally with distilled water whereas groups 2 and 3 was administered with acetamiprid. The insecticide was given at two dose levels (1/20 LD50 and 1/30 LD50) through oral route for 15 days. The mice receive water and food every day at will. The liver sections were observed with optical microscope. At the end of treatment, the mice are sacrificed, and the liver is removed for study by light microscopy. Body weight gain showed a non-significant increase in all mice. However, microscopic observation showed significant alterations in the hepatic parenchyma. The histopathological effects included disorganization of the hepatic architecture in some areas, frequent sinusoids dilatation, congestion in the central vein, thickening of portal vein's endothelial membrane, swelling and vacuolization of local hepatocytes in addition to nuclear hypertrophy. These results are in favor of an inflammatory process at the tissue level. According to the results, we conclude that even low doses of acetamiprid can be toxic to adult male mice at the tissue level.

Key words: *Acetamiprid; Liver, Male mice, Histopathology, Toxicity.*

6. RURAL DEVELOPMENT AND AGRO-ECONOMY

COMPETITIVENESS OF SUGAR BEET PRODUCTION IN AUSTRIA AND MIDDLE EUROPE AFTER 2017

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Abstract

In the course of the reform of the European Union`s Common Agricultural Policy in 2013, the member states and the EU parliament reached an agreement on abolishing the sugar quotas by the end of 2017. This study focuses on the effects of the policy change on the competitiveness of sugar beet production in Austria and compares the results with findings in other countries. Based on gross margin calculations for the years 2011-2015 competitiveness of sugar beet and alternative cash crops are analyzed. Furthermore, scenario analyses comprising various sugar prices and the effects of transportation costs on regional competitiveness are presented. Beside national analyses, an international survey with experts from the Czech Republic, France, Germany (north/south), Hungary, Poland and Slovakia provides some insights into the sugar beet and cash crop sector in neighboring countries comprising effects of voluntary coupled payments for sugar beets on competitiveness in various member states. The quantitative part deals with the economic performance of sugar beet production and competing cash crops followed by a qualitative questionnaire to analyze the strategies of sugar beet farmers and the sugar industry concerning the post quota time. The results show that in Austria as well as in the surveyed member states the sugar beet production compared to competing crops was highly competitive, although the gross margins were generally declining due to low crop prices of the competing crops during the last few years. Concerning regional competitiveness the design of the industry agreements between sugar beet producers and processors like a partial participation in the transportation costs of sugar beet farmers may change the competitiveness of sugar beet production also on a regional level. It is expected that in Middle Europe the sugar beet production will shift towards more competitive growing regions like in Germany and France due to more intense competition within the European market.

Keywords: *sugar beet, competitiveness, end of quota, sugar market, sugar industry.*

INTAGIBLE ASSETS IN THE RETAIL FOOD

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Abstract

There is growing importance of econometric analysis of intangible assets impact on the performance of companies, what seems apprehensive concerning the innovations, new technologies, brand, knowledge and other components of intangible assets for improving the companies' performance. To our knowledge, there are a few papers dedicated to the research of specifics of intangible assets impact on the performance of trading and retailing companies, food retailers, respectively. One of the reasons for this we find in lack of adequate data, especially for econometric analysis, because many companies do not enclose full data on intangible assets in their financial reports, or do it partially. Taking all this into account, we intend to elaborate the specifics and impact of intangible assets on the performance of global food retailers, with particular emphasis on Serbia. We ground our research on theoretical and methodological knowledge and reliable empirical data. The aim of the research is to thoroughly elaborate on theoretical and practical issues of non-material assets in retail. The knowledge of significance and the structure of non-material assets is fundamental prerequisite for its efficient management so as to meet the desired profit in concrete retail food company. As far as we know, there are no fully written papers dedicated to the analysis of intangible assets in retail food, especially in Serbia, in what we find our contribution to the treated problems. There is growing contemporary literature written on the general analysis of intangible assets of companies, both from the accounting point of view, and from its influence on performance. Nevertheless, as far as we know, there are no fully written papers dedicated to the analysis of specifics of size and structure of intangible asset in retail food. We strive to research the issue, especially on the examples of global, and food retailers in Serbia, in what we find scientific and professional contribution of this paper. Adequate managing of intangible investment can fulfil the desirable profits of retailing companies. Under the influence of different factors, above all technology innovations, development of private brand and advancement of knowledge, the share of intangible assets in total assets in trade and retail (food) differs among countries. So, for example share of intangible assets in total assets of retail (food) companies is Serbia is significantly lower compared to countries of developed market economies. It reflects their overall performance. That is why there should be more investments in creating intangible assets, especially private brand, information and communication technologies and advancement of knowledge.

Key words: *innovation, customers, brand, technology, knowledge.*

BEING A LOYAL ORGANIC CONSUMER HAS ITS PRICE

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Abstract

The consumption of organic food has recently increased in many countries - also in Denmark. In fact, per capita organic consumption in Denmark is the highest in the world. Despite the overall growth in organic consumption many consumers perceive high prices as a major obstacle for buying organic food. In this paper, we analysed to which extent organic purchases burdened Danish households' food expenditures. The study was based on data from GfK-Consumer Tracking for 2006-2014. Data included registrations of purchases of daily commodities made by a panel of approximately 2,500 Danish households. The data set encompassed details on product type, volume and quantity of purchased goods as well as background household characteristics such as age and gender. Econometric analyses were used to estimate overall costs and price sensitivity related to organic consumption among four organic consumer segments with different levels of organic consumption. The results indicated that overall food expenditures increased slightly with organic purchases. Not only differences in organic budget shares, but also systematic differences between the household segments such as store selection, household size and residential community, had an impact on food expenditures. Also, differences in price sensitivity were found which indicated that households with high organic budget shares were less sensitive towards organic price changes. This low price sensitivity of dedicated organic consumers may contribute to increasing food expenditures,what can be attributed to organic price premiums. Hence, loyalty towards organic consumptions has its price - not only due to price premiums.

Keywords: *price elasticities, purchase data, organic consumption, food expenditures.*

ROLE OF WOMEN IN DECISION MAKING IN THE FIELD OF AGRICULTURE A STUDY AT BIHAR (INDIA)

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Abstract

Agriculture is the main engine of growth for economic development as well as to eradicate the poverty in almost all developing countries. Women are the main pivot around which this whole phenomenon rotates. They play key role in not only producing and preparing food but in raring animals, collecting fuels, caring for family members and maintaining their homes, nursery gardening, rural marketing and trading, fetching of water and many more activities related to farm and production. For total livelihood sustainability it is the women who play a major role but somehow it has been found that their role in decision-making has been gradually diminished from Vedic era to modern era (particularly in case of Indian context). In India women were more privileged and bold in our early civilization. That is why the present study was conducted in 2015 in a small district of Bihar (India) in order to access their percentage in decision-making process in the field of agriculture. During early age women were allowed to take decision not only in ruling the kingdom but in war field too. As the age turned on due to different emperors their role went down but still few examples are there in front of us (Rani Laxmibai, Indira Gandhi, Pratibha Singh Patil etc.). The result of collected data out of 100 respondents depicts that only 8.33% landless women farmers take decisions in the field of agriculture followed by 19.27% of medium women farmer and 20.47% of small women farmers and maximum of 29.35% by marginal women farmers.

Keywords*:* *Landless, Medium, Small Women farmer.*

POVERTY ALLEVIATION THROUGH GRASSROOTS MOVEMENT OF DRYLAND AGROFORESTRY DEVELOPMENT IN YOGYAKARTA, INDONESIA

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Abstract

Despite the need for fertile land for agricultural development, there are nearly abondoned drylands all over Indonesia that are not utilized properly. Initial field experimental research that was started in 2008 consisting of two stages, pilot and extended pilot programs, proved that such drylands could be converted into profitable integrated agroforestry. This article is a conceptional plan based on previous finding focusing on a road map concerning the role of smallholder farmers community in support to the development of full scale agroforestry program. More specifically, the poverty alleviation among the smallholder farmers could be achieved through community involvement in, among others, human resources support, intercrops farming, animal husbandry, organic fertilizer production from the waste and animal's dung, and post harvest production, as part of agroforestry development being developed by investors. Previous study indicated that the income generated from intercrops farming and animal husbandry are profitable and, therefore, will significantly increase the farmers wealth. The potential income of the smallholder farmers was calculated by using enterprise budget method. It was proven that the smallholder farmers could gain significant income through intercrops farming and other activities in relation to the main agroforestry development activity. Upon the success of this research, it is expected that the government policy should be shifted from allowing fertile land to be grabbed by large corporation into community-based participatory of marginal drylands.

Keywords: *community participation, grassroots movement, integrated agroforestry, marginal drylands, poverty alleviation.*

INTRODUCING RICE-BASED AGRO-ECO-TOURISM AS A NEW OPPORTUNITY IN CENTRAL-WEST ASIA

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Abstract

Central-West Asia region: Afghanistan, Iran, Iraq, Kazakhstan, Kyrgyzstan, Tajikistan, Turkey, Turkmenistan, Uzbekistan, in spite of climate diversity, common and rich rural and agricultural culture, is among the most critical regions worldwide in terms of rice demand and production. Regarding climate change, fragility of the global rice market and increasing rice demand in the world especially in CWA region, regional cooperation and solidarity is being crucial more than before to overcome concerned difficulties through conducting multidisciplinary projects such as agro-eco-tourism exploiting agricultural systems. Indeed, rural development could be achieved by cultural exchange pertaining to sustainable rural agricultural practices. Therefore, Central and West Asian Rice Center (CWARice) in collaboration with NGOs and private sectors identified touristic attractions of main rice producing areas and its linkage with other natural & historical attractions in 10 above-mentioned member countries. Rice production systems are unique and the longevity of rice farming speaks for itself. The phrase "rice is life" is not to be taken lightly because the grain figures in many creation beliefs across Asia and is deeply embedded in social practices and customs. In this regard, the initiative plan, AgroEcoTourism, based on rice production systems implemented for the first time in the region will provide the opportunity for people and local farmers to increase income and lifestyle regarding the significant economic power, vast natural resources, dynamic work force and a huge potential for sustainable development in the region. Through this there are presented new opportunities for education in agriculture society and ecosystems, too. It will also promote local products and create added value through direct marketing and stimulates economic activities to increase benefits in societies where the agro-eco-tourism is developed. Consequently, AgroEcoTourism aims to protect the environment while contributing to socio-economic development through the tourism industry, thereby striving for local sustainability.

Keywords: *AgroEcoTourism, rural Development, Agricultural Systems, Rice.*

EVALUATING FOOD SECURITY IN IRAN: IVAN CITY AS A CASE STUDY

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Abstract

Food security which is defined as physical and economic access to sufficient, safe and nutritious food for all people is one of the basic human needs. The present study was conducted to evaluate food security condition in Ivan city, Southwest of Iran. Total of 400 households were selected randomly and their socio-economic data were collected by validated questionnaire and face to face interview; food security data was collected at summer 2015 using an 18-item food security questionnaire developed by USDA. Results showed that food insecurity exists in the studied population and is associated with socioeconomic status. Results indicated that 12 percent of studied households had undesirable food security condition, 23.5 percent had relatively undesirable food security condition, 31.8 percent had relatively desirable food security condition and 32.7 percent had desirable food security condition. Value of Pearson correlation between food security index and economical index was 0. 661 which revealed a positive and relatively high correlation between these two indices. Results showed that improving economic condition of households would improve its food security. Parental education, parents' jobs, household expenditure, household income, house property, car ownership status and loan repay showed significant correlation with food security. Family size, however, showed significant negative relation with household food security.

Keywords: *Food security, economic index, Iran.*

ROLE OF COOPERATIVES IN SUSTAINABLE RURAL DEVELOPMENT IN IRAN: A CRITICAL REVIEW

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Abstract

Agriculture in Iran is responsible for 20% of employment, 12% of Gross Domestic Product (GDP) with 100 MT annual production and self-sufficiency coefficient of 55%. Historically, two paradigms have been suggested for agricultural section in Iran: independency-oriented paradigm which is looking for complete self-sufficiency for providing food security in the country vs. development-oriented paradigm which is focusing on sustainable and economically viable development of this section in the country. Because of numerous factors, including economic, infrastructural, technical as well as climatic and edaphic constraints, independency-oriented approach has not been successful during last decades; so policy makers are now seeking for a sustainablemodel for development of agricultural section and rural area in the country. Agricultural systems in Iran are mainly small-holder systems; so according to global experiences, cooperatives has a crucial role for empowerment of farmers, distributing inputs, knowledge and science as well as improving market access for domestic products. As a successful experience, organic agriculture has been developed in many developing countries like India, Mexico, Ethiopia and Turkey through local agricultural cooperatives. As agriculture in these countries has many structural similarities to Iran, it is believed that development and investment in these cooperatives will facilitate sustainability of agriculture and rural development in Iran substantially. The most successful Iranian agricultural exporters have been operating as regional cooperatives during last decades, including cooperatives and associations for strategic commodities like pistachio, saffron, raisin and nuts.This paper presents some key mechanisms for their future perspective for agricultural and rural sustainable development in the country.

Keywords: *Rural development, export, organic farming, small-holder.*

CONSUMERS' ATTITUDES TOWARDS THE CREATION OF AGRI-ENVIRONMENTAL SERVICES: LITHUANIAN CASE STUDY

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Abstract

This study aims to identify consumers' attitudes towards the creation of agri-environmental services (i.e. reduction of underground water pollution, preservation of biodiversity, sustenance and improvement of agricultural landscape) in Lithuania. The survey of 460 Lithuanian citizens aged above 18 was performed in October and November 2015. The sample is representative stratifying the population by gender and the area of residence, i.e. approximately 40% respondents of the survey were males; about 30% of the respondents were from the rural areas. Results show that Lithuanian consumers find reduction of underground water pollution as the most important attribute, while sustenance and improvement of agricultural landscape are viewed as the least important. The provision of agri-environmental services is more important to women than men, while reduction of underground water pollution and preservation of wildlife species diversity are more important to younger generation than older generation. The majority of consumers of all income groups believe that preservation of biodiversity is either important or the most important. Sustenance and improvement of agricultural landscape are more important to respondents with lower income than respondents with higher income. It has been found that sustenance and improvement of agricultural landscape are less important to those who are better aware of the effects of agriculture on the environment than to those who do not have this knowledge. The majority of respondents believes or tends to believe that agri-environmental services significantly contribute to their well-being.

Keywords: *agriculture, agri-environmental services, consumer behavior, Lithuania.*

DEVELOPMENT TRENDS OF BOSNIA AND HERZEGOVINA'S AGRI-FOOD EXPORT SPECIALIZATION

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Abstract

Agri-food export is a significant contribution to the farmers' budgets as well as a driving force of the economy. The present report represents an assessment of specialization in agri-food products exported by Bosnia and Herzegovina in trying to display its development trends in trade with the rest of the world and EU during 2005–2016. The aim of this study is to evaluate the characteristics of specialization in agri-food products' export, revealing the developmental features of export structure, concentration, diversification, comparative advantage in EU and world markets. In BiH's agri-food export structure, the leading 2-digit product group "prepared foodstuffs, beverages" represented more or less 50% of BiH''s total agri-food export for the whole period. During the considered period, the volumes of exported agri-food goods to world markets increased faster than export to EU. Also, the study revealed that BiH's export to the rest of the world demonstrated a higher level of specialization in agri-food products as well as a greater diversification. Sufficiently diversified export composition is economically important for local producers to supplement their income and ensure their economic survival. The structure of BiH's agri-food export was sufficiently similar comparing the trade of the country with the trade of the rest of the world. This and the long list of products with higher comparative advantages as well as their positive trends in EU case suggest that the country has a potential to develop its export and more effectively compete in EU markets.

Keywords: *Agri-food products, export, specialization, comparative advantage, development.*

MANAGERIAL CHALLENGES AND LEADERSHIP IN FUNCTION OF DEVELOPMENT OF MODERN AGRIBUSINESS COMPANIES

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Abstract

The turbulent global environment and the current conditions in the economy are forcing agribusiness companies for a fast and flexible adaptation to the changes. A precondition for that is an effective system of management and application of appropriate leadership style. The management is a process of creating and maintaining a business environment where individuals work in teams to achieve the set goals. The leadership as a function of management involves the establishment of interpersonal relationships, leadership, employee motivation and communication. The purpose of this paper is to determine the capacity of managers as leaders of certain organizational levels in enterprises in the field of agricultural business. Considering the absence or presence of certain characteristics, it is estimated the extent to which managers express their leadership potential. To achieve the goal of the research, we applied the method of questionnaire survey conducted in ten medium-sized enterprises (from 50-250 employees) in the field of agribusiness in Republic of Macedonia, at a strategic, tactical and operational management level. The results from the conducted survey indicate that managers in agribusiness companies mostly expressed tendency to think like leaders and their behavior is close to modern knowledge for effective leadership. In the agricultural business sector in Republic of Macedonia predominates the known and stable management practice. It is a fact that the dynamic business environment of the food industry requires particularly high professionalism, innovation and ability to coordinate their leading personnel. Regarding the actuality of the topic of leadership and its importance for the business success of the company, this research provides an overview of the functions of management in some selected Macedonian enterprises in the area of agricultural business.

Key words: *Management, Leadership, Agribusiness, Business success.*

MACROECONOMICAL ASPECTS OF AGRICULTURAL ECONOMIES IN THE DURMITOR AREA AS INDICATORS OF RURAL DEVELOPMENT

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Abstract

Agriculture,together with tourism,is a social commitment and represents the basis of further development of Montenegro,and being the first ecological state in the world further strengthens such commitment.The available agricultural potentials of the Durmitor region,in spite of certain limitations,are inevitable in the creation of Montenegrin arable land in general.Speaking frankly,the tendencies in agriculture of the region are somewhat negative compared to the general situation in the country.The same occurrences have been seen in other countries with "highland complexes"in agriculture in developed countries have beeneliminated with proper economic policies.Foreign but also domestic experiences tell us that it is possible,through contemporary,techno-economic means,to organize production in highland areas.This implies adequate choice of measures,methods,and conducts,through which the achievement of better production structures of natural,agricultural and climate data,relying on previous researches and production practices of the region.The problems which a peasant-microfarmer and a firm-macrofarm face in the Durmitor area are numerous and they are solely connected with their basic activity,the existing of animal husbandry.Raising of cattle and sheep,as well as producing of dairy products,kastradina(smoked,mutton meat,lamb meat),have been and still are traditional activity.These problems could be grouped in two big groups;natural and social ones.In the first group there and relief,geographic and pedological-biological characteristics of soil,climate,vegetation period,problems with use of grasy areas,attitude,ecology-problems and unsatisfyng race structure.In the research of the influence of special factors(we dealt with a lot of individual farmers and three collective farms)we have found extremely bad and negative conditions of business,and very bed use of cattery,fodder capacities and possibilities of Durmitor area.The reasons of such a bad situation are numerous and they can be traced in the bad state ruling of agrarian politics i.e economic measures of support as wellas organizing-economical efficacy in the catle raising.For these reasons the ways for problems solutionsin the farm cattle raising in Durmitor area must lead to elimination of these causes,inpointing to a conception of new agrarian politics which will(with economic factors stimulating development)transform these goods producers to modern farms.

Key words: *agricultural resources, potentials, healthy food, Durmitor region development program.*

FOOD CONSUMPTION IN PAKISTAN: APPLICATION OF LINEAR APPROXIMATE ALMOST IDEAL DEMAND SYSTEM

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Abstract

This paper aims to examine the food consumption decisions of households in Pakistan to understand the demand for different food commodities and to determine the effects of important economic factors such as prices and income. Linear Almost Ideal Demand System model is applied to estimate food demand patterns using the Household Integrated Economic Survey of Pakistan for the year 2011-2012. Food products are categorized into fourteen groups including milk, vegetables, sugar, rice, fruits, beverages, wheat and wheat flour, other cereals, pulses, oil and fats, tea and coffee, backed products and other food. Economic factors such as food commodities price and household income and their socioeconomic and demographic characteristics are included in the model. Prices of basic food items such as wheat and wheat flour, baked products, milk, meat, fruits, vegetables, beverages, rice, other cereals, pulses, oils and fats, tea and coffee and baked product should be kept constant. Imposition of any sale tax could create huge loss in consumption for these commodities. The uncompensated own price elasticity of demand for milk, meat, fruits, rice, other cereals and backed products are more elastic to food expenditures and can be categorized as luxury goods. As the demand for milk, meat, fruits, rice, other cereals and backed products are more elastic to total food expenditures (income). Imposition of any income tax on household personnel income could reduce their consumption of these food groups. Such policies could result in food security problems for low and middle income households in Pakistan.

Keywords: *demand system, LA/AIDS, food demand elasticities, expenditures elasticities, Income Elasticities.*

ACCESS TO SUSTAINABLE RURAL DEVELOPMENT THROUGH THE GOVERNANCE OF AGRICULTURAL NGOs IN THE SOUTHERN WEST BANK – PALESTINE

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Abstract

Governance Agricultural NGOs is management approach that provides the Agricultural NGOs with procedures and policies that define the manner in which operations are managed efficiently The study population consisted of the heads of board, directors of each Agricultural NGOs, the directors and heads of departments in the Agricultural NGOs. The study aimed to identify the reality of governance in Agricultural NGOs, NGOs in the southern West Bank and what is the most important application of mechanisms, identify the most important follow-up procedures ,To apply the principles and concepts of governance accredited to the United Nations Development Programmer, the most important problems and challenges that the Agricultural NGOs in the south of the West Bankfacing were identified For this, the researcher used the descriptive approach through a comprehensive survey of all members of the community, total number (74), The researcher worked on the development of the questionnaire after being sure of the validity and reliability of the tool ,The researcher distributed the questionnaire, copies retrieved was(62) , the percentage of recovery(83%). In order to gather information, the researcher reviewed previous literature and analyzed and processed the output resolution using statistical packages for social science program SPSS.The researcher reached results as follows: the reality of governance in Palestinian Agricultural NGOs was medium, the governance was considered as an effective way to achieve the internal control of the Agricultural NGOs, through the application of corporate governance standards so that Agricultural NGOs could identify their needs, governance helped the Agricultural NGOs administration to make decisions .One of the most important results was that governance of agricultural NGOs worked to develop these institutions, which improve the quality of life and the economic well-being of farmers, pastoralists and agricultural workers. These institutions focused on the development of projects and programs based on the exploitation of land-intensive natural resources such as agriculture, livestock and fisheries. They include improved agricultural services, agricultural incentives and technologies, and resources used in agriculture, such as land, irrigation, human capital and rural infrastructure. Agricultural development is an important component of sustainable rural development, which improves the opportunities and well-being of the rural population. In addition, it involves human development and social and environmental goals, not just economic objectives. This leads to the sustainability of rural development, which includes rural development, health, education and other social services.

Keywords*: Governance, NGOs, sustainable rural development, West Bank-Palestine.*

BENEFITS AND DISADVANTAGES FOR RURAL COMMUNITIES RESULTING FROM SECOND-HOME TOURISM: LOCAL PEOPLE'S VIEW

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Abstract

Searching for alternative, other than farming, sources of income and economic activities for the rural population is of key importance for the development of rural areas in Europe, considering unemployment, outmigration, ageing and depopulation. At the same time, second-home owners coming from outside have become an important element of local trade exchange and services markets in rural areas as well as budgets of community councils, farms, enterprises and households. Hence, second homes can be considered as a one of the favourable conditions for implementing the conception of multifunctional rural development, especially through the suitable use of the demand of seasonal residents for the local agricultural produce and services. The main study objective was to collect local people's feedback on second homes in Finland and Poland then contrast their opinions to the state-of-the-art in the second-home research, especially concerning economic impacts. It was of a great importance to learn more about:

- whether the locals (represented by farmers, entrepreneurs and other individuals) share academics' view on beneficial influence of second homes on rural economy and development perspectives;
- how they perceive and assess second homes in the context of rural development and economic perspectives;
- whether and how their viewpoints differ depending on various factors: respondent's personal socio-demographics, geographical, functional, administrative and tourist characteristics of the second-home municipality, etc.?

The data were gathered from questionnaire survey in Poland and postal survey in Finland. The backward stepwise regression was applied as the main method and additionally supported by U Mann Whitney test.

Key words: *second homes, local development, rural areas, Finland, Poland*

THE ROLE OF COOPERATIVE MOVEMENT IN DEVELOPMENT OF RURAL AREAS: A CASE STUDY OF POLAND

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Abstract

The cooperative movement evolves in contemporary economies through care for interests of its members and as a result of professing practical ideas (economic solidarity, collective resourcefulness, mutual cooperation). Cooperatives mainly serve local communities, since they often are their closest partner. Agriculture is one of the sectors of the Polish economy with the largest number of cooperatives (2629 in 2015 or 15% of all in the country). Cooperatives still play an important, though decreasing role in agriculture. There are several types of well-functioning rural cooperatives that support the development of agriculture and rural areas. There are the so-called cooperatives "Farmers Mutual Aid" (over 1100) engaged in retail and wholesale trade, food production. Agricultural production cooperatives (700 cooperatives), which are focused on plant and animal production. Cooperatives of Farmer's Circles (517) mainly provide services to farms and other entities in the countryside. Dairy cooperatives (140) hold 60% in purchasing and processing milk in the country. The development of agriculture and rural areas also supports a specific type of cooperative, ie. co-operative banks (559 in 2016). They have a dense network of outlets (4633 or 38% of the banking sector with 33,000 employees or 20% in the banking sector). Tradition of credit cooperatives in Polish lands in the field of financing rural and agriculture is over 140 years. Cooperative banks include in their operating activities capital needs of agriculture, finance structural transformations in this sector. Agricultural cooperatives in Poland face developmental challenges. The opportunities for growth is the revival of trust among farmers for this form of cooperation.

Keywords: C*ooperatives, Cooperatives movement, Rural development, Poland.*

PLANT GENETIC RESOURCES AND GASTRONOMIC TOURISM

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Abstract

Plant genetic resources for food and agriculture (PGRFA) came into the world attention due to their genetic erosion upon the adoption of the International Treaty on Plant Genetic Resources for Food and Agriculture (Plant Treaty) in 2001. Among these, landraces are recognized for their value when are maintained in the same agro-ecosystem for more than 50 years. However, food security as a complex and sensitive subject, is acting between national and local levels and depends on socio-economic attributes of rural societies deeply embedded in the history of the place grounding the traditional knowledge (TK) related to local communities' lifestyle. In the past 25 years Romania lost more than 75% of its own plant genetic resources based on recorded official data, even its economy depends on the activity of more than 69% small landowners (i.e. over 800,000.00). From economic point of view, such type of agriculture is not productive. However, 32% of the today Romania's territory is declared as protected areas and most of these arable lands are in buffering zones or inside protected areas. Studying the village Ațel, from Sibiu county, Valea Târnavelor (i.e. in the buffering zones of protected areas), reveals that rural areas are rich pools of landraces that have been preserved and cultivated by at least 50% of local householders for more than 50 years (i.e. wheat, corn, rye, barley, oats, peas, cabbage, beans, onions, lettuce, spinach, celery, parsley, garlic, carrot, dills). The poorness of these villages in the today economic terms is counteracted by the richness of biodiversity, TK, PGRFA and local gastronomy. The scope of this article is to envisage original approaches, for connecting local TK to economy based on gastronomic tourism that may provide these villages the chance to become part of it.

Keywords: *landraces, food security, rural development, on farm conservation, gastronomic tourism, traditional knowledge.*

THE STUDY OF LAND TENURE IN THE MORĂREŞTI CADASTRAL TERRITORY, ARGEŞ COUNTY IN ORDER TO RESTORE THE ECOLOGICAL EQUILIBRIUM

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Abstract

The work represents a complex pedological study in the area of Moraresti Arges County, an area strongly affected by erosion processes and landslides. The study consists in the making of soil profiles and surveys, in order to identify the representative soil types, their morphological and physico-chemical characterization, classification in pretentious classes and favorability, as well as the calculation of the bonuses on crops. Due to different local conditions (hill and meadow), two types of soil (aluviosoil and eutricambosoil) resulted, both of which are consistent with environmental factors. In the meadow area, the parental material is represented by fluvial deposits and in the hilly area, clay deposits. Definitely the vegetation is different, contributing to the genesis of these soil types. Based on field research in the meadow area (aluviosol), the land can be used in vegetables scope, with predominantly root species and in the hilly area it is recommended to set up fruit trees or fruit trees depending on the soil reaction value. In the upper area of the slope, natural pastures or woodlands are recommended to restore the ecological balance of the area, given that the land has been abandoned and erosion processes have intensified.

Key words: *study of soils, erosion soil, hydrographic basin, ecological balance.*

AGRICULTURE - A BASE FOR ECONOMY IMPROVEMENT

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Abstract

Agrigultural production is a main resource for food products and prevention of malnutrition of world population. Arable land is a limited resources for agricultural production - 0.4 ha per capita in the world. This requres attention for rational and optimal use of natural resources for agricultural production, particularly because of the fact that the rise of world human population in the future is predicted, over ten billions citizens. In previous century progress in agricultural production was achieved by developing conventional agriculture and industrial revolution, particularly from the begining of „Green Revolution" which was characterized by growing technology with a greater use of fertilizers and pesticides. Agricultural resources are under preasure of spreading urbanization, and arable land used for developing factories, towns, industrial buildings, landfills, roads, railways etc., from the period of the Industrial Revolution, up to nowdays. Another problems that disrupts agricultural production is pollution from metal and chemcal industry, towns, while in the future a new challenge is climatic changes. Since the beginning of the Industrial Revolution, the concentration of carbon dioxide in the atmosphere has increased by 30%, the concentration of methane has doubled and the sodium oxide increased by 15%. These increases affect the retention of heat in the earth's atmosphere on the principle of the greenhouse effect. The influence of unfavorable condition on agricultural production requires intensive work on resolving adaptive and efficient model(s) of agricultural production under the global climate changes and trend of increasing human world population.

Key words: *agriculture, producttion, economy, rural development, technology.*

STATE AND PROSPECTS OF RURAL TOURISM DEVELOPMENT IN KOLUBARA DISTRICT (SERBIA)

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Abstract

The paper is based on a multifunctional model of agriculture, which in addition to manufacture of vegetable and livestock production, implies development of other complementary activities for the economic viability of rural households and their family farms. The implementation of this model of agriculture on small family farms in Serbia, puts a special emphasis on rural tourism. The study analyzed Kolubara District, and six municipalities and their villages: Valjevo, Ub, Lajkovac, Mionica, Ljig and Osecina. The expected results of this work are the promotion of Kolubara District, as a new destination rural tourism at national, regional and European tourist market. Taking into account the level of research for this study, the expected contribution would be to identify tourism products of Kolubara District and to identity tourist attractions and potential for rural tourism development. Kolubara District with natural resources its cultural and historical heritage of traditional architecture, cuisine, folk traditions, local crafts, native livestock breeds and plant varieties has the potential for development of rural tourism. The offer of the rural tourism in Kolubara District includes villages, ethnic villages, ethnic houses and events that give tourists an authentic experience of a rural environment. Development of rural tourism in Kolubara District is directly connected with the income from tourist consumption because the purchase of additional products and special services outside of rural household, income can increase by 50 percent or more. All municipalities in the Kolubara District have a strategy for the development of agriculture and tourism, which emphasize rural tourism as an important factor of mutual development. Their implementation would be applied in practice multifunctional model of agriculture and rural development, and rural tourism.

Keywords*:* *Rural tourism, tourist services market, promote, Kolubara district.*

GENERAL MATHEMATICAL MODEL FOR THE LINEAR OPTIMIZATION OF A MULTIFUNCTIONAL FARM

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Abstract

In this paper, a general mathematical model of the multi-criteria linear programming problem has been developed that can be used to optimize the production processes and services, offered by multifunctional farms. The model comprises the following components: independent variables, the matrix of limitations and two objective functions. The independent variables for plant production, husbandry another processes and services are defined individually. The model also takes into the account internal (production and technology related, biological) limitations as well as external (market related, financial) limitations. The objective functions of the model deal with both, the total maximal effectiveness and the overall efficiency of the farm. The economic effectiveness within the model is represented by the total gross margin (difference of the total income and the direct variable costs), whereas the farm efficiency defined as the quotient of total income divided by the total costs. For solving the model, which deals with the maximization of the total gross margin, a linear optimization method has been applied, while for the maximization of the farm's efficiency a non-linear approach has been utilized. Also, by applying two different optimization methods, two different optimal solutions have been received. Eventually, the farmer must decide, which solution is the most suitable for him/her. The model has been tested on a multifunctional farm in Germany.

Keywords*: model, linear optimization, multifunctional farm.*

USING PUBLIC SECTOR FOOD PROCUREMENT BY SCHOOLS IN SERBIA TO STIMULATE LOCAL AGRICULTURE

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Abstract

The Horizon 2020 project Strength2Food includes a school meal pilot scheme to help stimulate local agriculture through public sector food procurement by primary schools in four regions of Serbia: Belgrade, Novi Sad, Valjevo area and Arilje/Ivanjica. A questionnaire sent to schools identified those using their own kitchens and cooks to prepare meals (about 28% of schools), and food procurement documents have been analysed to identify existing suppliers. So far 33 schools in these four regions have been visited to discuss taking part in the meal pilot scheme and nearly all school directors have been interested in participating. Further, on a 1 (not interested) to 5 (very willing) scale for willingness to support local agriculture, the mean score for 39 target region schools was 4.33. We are also identifying small producers and agricultural cooperatives local to those schools, and have spoken so far with 10 producers. Considerable challenges to success will need overcoming. Schools are uncertain about changing their tender criteria because procurement law requires the lowest economic bid to be accepted. So, training in tender preparation is planned. Cooperatives may be reluctant to bid because of relatively small values of school contracts, and small farmers will struggle to meet food standards for safety/certification. Nevertheless, we are collecting unit food prices paid by schools to successful bidders to discuss whether local producers could at least match those prices. We are also screening labels on packaging to identify the proportions of fruit, vegetables, meat and dairy products that are already local.

Keywords: *Local agriculture, Food procurement, Primary schools, Serbia.*

AN EVALUATION OF MARKET PARTICIPATION OF SMALLHOLDER FARMERS IN EHLANZENI DISTRICT, MPUMALANGA PROVINCE, SOUTH AFRICA

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Abstract

This paper highlights the factors affecting market participation of rural small-scale farmers in Ehlanzeni South District Municipality. Project assessment was conducted in Ehlanzeni South District by the Agricultural Research Council (ARC) in collaboration with the Department of Rural Development and Land Reform (DRDLR) with an attempt to identify market needs in the district. A total of 54 horticultural projects with 538 beneficiaries participated in the study, coming from the following local municipalities: Mbombela, Umjindi and Nkomazi. Quantitative and qualitative designs were used as a detailed questionnaire written in English, with a focus group discussion, stakeholder's discussion and field observations as part of the data collection. A purposive sampling technique was used to select fifty-four (54) projects, in order to cover uniformity and homogenous characteristics, such as infrastructure requirements, skills availability, production challenges, agricultural training needs, water source needs, educational level, market availability and other factors. Data were coded, captured, and analysed using SPSS. The descriptive and univariate regression analyses were conducted. The results showed a positive association among the following variables: age, educational level, farming experience, land size, planted crop, water source, land acquisition, production inputs, fulltime farming, agricultural training and market participation. It is evident that interventions should be implemented, with a focus on the identified factors in order to improve market participation of small-scale farmers.

Key words: *Market Participation, Horticultural Projects, Ehlanzeni South District Municipality, Mpumalanga Province and South Africa.*

COMMUNAL LANDS AND RURAL DEVELOPMENT IN THE NORTHWESTERN IBERIAN PENINSULA

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Abstract

Communal lands occupy about one million hectares in the northwest Iberian Peninsula with high average areas (500 hectares in Portugal and 200 in Galicia). The region is among the poorest in the European Union with a notably lower gross domestic product in comparison with the most developed regions of Europe. Over centuries, *'Baldios'* in Portugal and *'Montes Veciñais en Man Común'* (MVMC) in Galicia played an essential role in the rural economy of their owner's communities. They were mainly used in forestry, but several reasons resulted in a current sub-utilization of them. This role was lost during the twentieth century due to great reforestation and a decline in agriculture prominence. The restoration of democratic regimes returned Baldios and MVMC to their owners, now declining, aging and disorganized. Taking into account the extension of these lands and their average size, this paper looks into the main historical determinants of the commons existence and tries to illustrate their present-day with reference to the collective action problem; features related to the commoners' (*'veciños'* and *'compartes'*) characteristics and to the way they use their lands are analysed. Both Galician and Portuguese realities exhibit similarities and complementary benefits requiring social innovation to make better use of rural resilience. Communal lands and small-scale business initiatives could support the network of the local produce markets with attractive values, and also the conservation of the biodiversity. These data are discussed focusing at the human and natural resources.

Key words: *Common lands, northwest Iberian Peninsula, local development.*

FEASIBLE STUDY OF SILK WORM BREEDING IN SYRIA OPPORTUNITIES AND CHALENGES

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Abstract

Silk worm rearing is one of traditional agricultural activities in Syria, known since ancient history. Support provided by the government contributed to the achievement of a satisfactory financial returns for all dealers in the silk worm chain. The financial feasibility scale & Cost-benefit is positive at the level of all dealers. By conversion transactions registered with the breeders noted that every one pack of silk worm eggs produces silk on average 40 kg of cocoons. This process has value added amounted to 17,500SL. while net profit reached 12057 SL. The preliminary data showed that every 40 kg of cocoons give on average 6-7 kg of silk prepared for manual spun yarn which in turn produces from 36-40 m 2 of woven fabric handloom. Financially , the production of 6-7 kg of yarns bring value added amounted on average 107 500 SL and net profit approximated 76000 SL. Silk textile and yarn are used in the production of traditional products like embroidered, handmade scarves, and other products. In general, breeding one tray of eggs can result in the end of the chain between 16-18 of traditional hand made pieces realized value-added textile prices 117000 SP and a net profit amounted about 85,000 SL. The entire returns on the whole chain of breeding one tray of silk worm eggs till the end of the process approximated 185000 SL; in addition, the volume of specialized employment and technical workers that can be engaged in this activity, breeding, production of silk threads, sewing, embroidery works that use mainly family labor, especially females.

Key words: *silk worm, filed survey, rural development, family labor, Syria.*

MILK CONSUMPTION CHARACTERISTICS IN SOME PROVINCES (ISTANBUL, SAMSUN, HATAY AND KAYSERI) IN TURKEY

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Abstract

This study was carried out in 2015 to determine habits of milk consumers in Istanbul, Samsun, Hatay and Kayseri. The study analyzed and evaluated the answers on consumption habits obtained in face-to-face interviews and from questionnaires. The attention was paid to the fact that these surveys were conducted in urban centers. The Chi-square analysis was performed using the R program and there were some differences determined. As a result of the study, milk consumption per capita was 4.83 in Hatay, 4.00 in Istanbul, 3.54 in Samsun and 4.45 in Kayseri. 92% of the respondents preferred cow milk, while the rest preferred sheep, goat and buffalo milk. While drinking plain milk was most preferred, drinking plain and cocoa milk was preferred in Kayseri province. In all the cases, it was determined that the respondents drank milk during breakfast and before going tobed. The respondents focused on the brand name and were not willing to change the favorite brand. At the same time, it could be seen that there were some serious differences between brands and this was taken into consideration in the preference stage. The most unsettling issue for the consumers was that milk was packed in the unhealthy environment and that animals from which the milk was gotten had not been raised properly.

Keywords: *Milk, Consumer, Chi-square analysis, Consumption characteristics.*

THE PLACE IN GLOBAL VALUE CHAINS OF UNPAID FAMILY WORKERS: THE CASE OF HAZELNUT PRODUCTION IN THE PROVINCE OF ORDU (TURKEY)

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Abstract

The effect of globalization on production processes takes place in the form of spatial diffusion of production. Countries are involved in production chains in line with the division of labour in the global system. Thus, from the production point of view, the value chains become global value chains (GVC). The GVCs also shape agriculture products. In this context, Turkey is ranked first in hazelnut export with a ratio of 70-70% in the GVCs. Access to the GVCs varies between men and women. These differences are shaped by gender roles. The GVCs not only benefit from this difference but can influence it. Moreover, these differences have different consequences for men and women at every stage. This study examines the GVCs linked to gender by adopting a feminist methodology. The article analyzes how women are participating in the GVCs in hazelnut production in the Ordu Province, a global hazelnut supplier, and identifies the situation of women. In this context, in-depth interviews were conducted with women working as unpaid family workers in hazelnut production in the Ordu Province and suggestions are provided for the provision of the equal opportunities for both women and men.

Keywords: *Globalization, Gender, Global Value Chains, Hazelnut Production, Unpaid Family Worker.*

OPPORTUNITIES AND CHALLENGES FOR THE FRESH STRAW MUSHROOM VALUE CHAIN DEVELOPMENT IN VIETNAM

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Abstract

Straw mushroom sector has been strongly growing in Vietnam since last decade with more than 64,500 tons/year of production. The development of the sector helps improving both farm household's income and the environment by reducing pollution from rice straw burning at the end of the rice cultivation season. Basing on the potential of the sector, Vietnamese government issued an agricultural development programme in 2010 in which mushrooms will be the focus to develop as one of five national strategic commodities. In order to help the sector reaching this goal and growing more sustainably, the study was carried out in 2014 and 2016 to identify its opportunities and challenges by analysing stakeholders in the fresh straw mushroom value chain. The study was carried out through different meetings among the main actors of the straw mushroom value chain in August 2014 in Can Tho and in 2016 in Dong Nai province, Vietnam, to get opinions of target groups, key persons, as well as information concerning the aims of the study. An analysis of the main stakeholders was conducted to identify opportunities and challenges for the sector to grow more sustainably. Low investment costs, depending on production scale, quickly received income circle, low land and labour effort use are the main opportunities for farmers while limited use of improved production/processing technologies, limited production due to the seasonal character and climatic conditions are the main challenges for the other stakeholders of straw mushroom value chain. To enhance the use of hi-technology in production, preservation and processing and to build a brand for the Vietnamese straw mushroom are proposed to improve the current issues of the sector.

Keywords: *Mushroom, value chain, stakeholder, Vietnam.*

GREEN INTERNET OF THINGS AND GREEN NANOTECHNOLOGY ROLE IN REALIZING SMART AND SUSTAINABLE AGRICULTURE

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Abstract

The application of Information and Communication Technology (ICT) advances in agriculture has completely revolutionized this sector. Unfortunately, alongside numerous advantages such as increased agriculture productivity and profit, the ICT has many disadvantages. ICT can harm the land, biodiversity and water sources and it can generate significant amounts of greenhouse gas (GHG) emissions. Therefore, the current research is being focused on finding novel approaches which will increase productivity in the agriculture sector with no or minimum impact on the environment and human health. Novel technological approaches, Green Internet of Things (G-IoT) and Green nanotechnology appear as the adequate solutions to create smart and sustainable agriculture and food industry. Production automation, precision farming, remote monitoring, traceability, decision making and forecasting, promise to completely transform agriculture and the food supply chain. Green nanotechnology brings more efficient use of agrochemicals and more advanced food production processes. More productive, sustainable and precise agriculture practices and enhanced food production will lead to increased productivity and profit while at the same time the usage of raw and non-renewable resources will be reduced. This will be accompanied by decreased pollution and emissions what will lead to the realization of smart and sustainable agriculture. Hence, this paper represents an analysis of G-IoT and Green nanotechnology concepts and their role in revolutionizing agriculture sector accompanied with eliminated or minimized negative influence on human health and environment. The realization of smart and sustainable agriculture will substantially provide significant economic and social benefits.

Keywords: *G-IoT, Green nanotechnology, Sustainable agriculture, Food, Environment.*

TRANSFORMATIONS IN THE GOVERNANCE STRUCTURE OF BULGARIAN AGRICULTURAL COOPERATIVES

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Abstract

For more than 25 years, agricultural cooperatives in Bulgaria have been operating in conditions of a rapidly changing socio-economic and political environment. The Institutional changes, blurring property rights, the separation of between ownership and management and change of the decision-making process, all required from agricultural cooperatives to undertake changes in the governance structure in order to answer the challenges of the dynamic environment. This means changing the direction of governance according the resources' empowerment by the management bodies. Cooperative management leads the decision-making process and fully accepts the management from the owners, changing its behavior model, in relation to the situation on the market. The increased competition and a rapidly changing market environment lead to convergence between the governance structure of the agricultural cooperative and the corporation. In that very long lasting and still ongoing transition period in Bulgaria, there is almost no sustainable cooperative model. In addition to the above, the cooperative management is transient, changing goals and values. Simultaneously, the cooperative governance structure is in the process of change, often deviating significantly from the formal and adopting the characteristics of the corporate one. The paper aims to explore changes and transitions in the governance structure of the Bulgarian agricultural cooperatives that lead to a balance between the interests of owners and managers, and guarantee the sustainability and efficiency of the structure.

Keywords: *Governance structure, Transformation, Agricultural Co-operatives, Bulgaria.*

FOOD WASTE AND LOSSES: INITIATIVES FOR SUSTAINABLE DEVELOPMENT

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Abstract

Rural exodus represents a major cause of urbanization processes in Third world countries. This phenomenon is particularly evident where the failure of markets regulatory mechanisms together with the lack of governance of the agroindustrial sector on an international scale have brought about several effects on a market where global dynamics prevail over local ones. Global food scenarios show a deep contrast between extreme hunger on one side, and food waste and losses on the other one. Therefore, the real issue to take into consideration is not the lack of food but its limited access, or no access at all, especially in less developed countries, as well as the inability of the agricultural sector to play its historical and fundamental role of socioeconomic growth booster. The mentioned subject matter, in particular, has been ignored for a long time, thus resulting in a current limited availability of data and of specific literature and bibliography. Recently there has been a growing interest in this theme, due to its relevance in facing environmental, economic and social challenges. The considered scale is both international and Italian, through the employment of a territorial approach. The identified initiatives consider the phenomenon of waste and losses in a global aspect and refer to companies, foundations and organizations of the large scale retailer sector.

Keywords: *Sustainable agriculture, Rural development, Food waste, Governance, Food supply chain, Global famine.*

RURAL POVERTY AND RURAL DEVELOPMENT: A CASE FOR FAMILY FARMING AND SUSTAINABLE TOURISM IN THE NATIONAL PARK OF GARGANO (ITALY)

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Abstract

Nowadays agricultural markets are going through a process of radical transformation and chances arise to make significant progress in the fight against rural poverty. Although during the past ten years more than 350 million people in rural areas have reached a standard of living out of the state of absolute poverty, global poverty itself remains a phenomenon predominantly rural. In order to put in place effective strategies, it is fundamental to create an environment that allows people living in rural areas to overcome all the challenges they face in their efforts to successfully manage their economic activities. This is particularly true with reference to Family farming in protected areas; in the National Park of Gargano, in Puglia region (Italy), the Park authority recognizes the important role of farmers in managing the territory of the Park itself, and in fostering rural development; an in-depth analysis of the Park agro-ecosystems constitutes the starting point to develop effective governance tools to preserve the agro-pastoral traditions of local communities and to enable the National Park of Gargano and the farmers operating in it to interact in order to develop a "management model" capable of assessing the agro-environmental sustainability of farms and promote their multifunctionality, with particular regard to sustainable tourism, leading the National Park of Gargano to become member of the Europarc Federation.

Keywords: *Rural poverty, innovative agriculture, agro-ecosystems, agro-biodiversity, sustainable tourism.*

MAIN CHALLENGES OF RURAL DEVELOPMENT STRATEGIES THROUGH TOURISM AND AGRICULTURE LINKAGES IN MEXICO

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Abstract

Addressing the model of extensive rural development in Mexico, as well as based on family production units (households) strategies formulation to establish linkages between agriculture and tourism such as Pluriactivity and Pro-poor Tourism, necessarily implies deepening historical analysis of the governmental intervention processes. Added to this, it is crucial to refine its study based on sociological tools which will allow a more complete and comprehensive understanding of the internal dynamics of the Mexican rural family, their trade difficulties within the market and the changeling relation between the city and the countryside. Despite the efforts in the application of rural development strategies and public policies to strengthen the agricultural sector in conjunction with other economic activities such as tourism, the lack of application of participative methodologies in the elaboration of diagnoses focused on the formulation of these, constitutes one of the main causes of the failure of projects such as the insertion of Pro poor tourism initiatives or farming Pluriactivity, due to the incompatibility of these with the economic, historical, social and cultural particularities of the Mexican peasant families. It is in this sense that the present analysis is developed, thus providing relevant data for research, debate and structuring new policies aimed at improving the agricultural sector through tourism.

Keywords: *Agriculture, Household pluriactivity, Pro-poor Tourism, Mexico*.

THE COMPETITIVENESS OF AGRICULTURAL AND FOOD PRODUCTS OF MOLDOVA ON THE FOREIGN MARKETS: ASPECTS AND TENDENCIES

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Abstract

Competitiveness has become a key issue on international markets since it can be considered as the major source of export development. A country that utilizes the best its resources within its agricultural sector may benefit from comparative advantage on international agricultural markets. The paper analyzes the agricultural and food trade of Moldova from different aspects of inter and intra industry trade. The aim is to estimate the trend and extent of inter and intra-industry trade in agricultural and food products of Moldova. The time series from 2001 to 2015 are examined. Moldova's share on agri-food exports is still large, but various changes occurred in the total value and the geographical structure of trade flows during the analyzed period. The analysis of competitiveness was through estimation of intra - industrial and inter- industrial trade indices (Relative Trade Advantages (RTA), Grubel-Lloyd (GL)). The obtained results indicate which agri-food products were competitive, which had relative advantages and a potential to increase its competitiveness. The level of intra-industry trade in agricultural and food products for Moldova is quite high (78%). The results of the intra-industrial trade level indicated a decrease in European Union (EU) countries and increase in relation with Commonwealth of Independent States (CIS) countries. For most commodity groups the GL values presented average high variability over time, fact which reflected the structural changes in Moldavian agri-food trade.

Key words: *agriculture, food, intra-industry, inter-industry, trade.*

POVERTY REDUCTION IN RURAL AREAS THROUGH AGRICULTURAL DEVELOPMENT: EVIDENCE FROM MOLDOVA

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Abstract

Agriculture is a main part of the rural economy and has an important role in ensuring incomes for rural population and poverty reduction. In Moldova, the largest share of the rural population is employed in agriculture, which contributes to about 50% of their total incomes. The aim of this research was to analyze the importance of the agricultural sector of Moldova and its contribution to poverty reduction of rural population. The paper estimated the time series from 2001-2015 provided by the National Bureau of Statistics. Also, the data of the General Agricultural Census (NBS, 2011) and the World Bank Report on poverty reduction (2016) were used. Nowadays, agricultural sector, despite the registered decline has an important role in the economic development of Moldova. The agricultural sector registered a decline of its share in GDP from 30% in 2005 to 12% in 2015. Also, the employment in the agricultural sector diminished from 50% in 2001 to 28% in 2015. A boost in investments in the agricultural sector would allow an alleviation in rural poverty and an increase in the population standards of living. But the problem in attracting investments is related to the fact that the large corporate farms prevail other small subsistence households which manage 60% and 40% from the useable agricultural area.

Keywords: *agricultural development, households, poverty, rural areas, Moldova.*

CAPACITY BUILDING OF BASIC COMMUNITIES FOR THE SUSTAINABLE DEVELOPMENT OF THE MOUNTAINOUS ZONES: CASE OF BEJAIA, ALGERIA

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Abstract

The study carried out within the framework of the project Mountain, in the massif of Bibans on a small zone of Ighil Ali, Béjaia, had for general objective to raise a current situation of natural resources, their mode of management and the living conditions of the local populations, in order to identify the sustainable activities susceptible to improve them. The fixed objectives aimed at first at characterizing and at estimating the conditions of life and production of communities, in particular state of natural resources (ground, water, biodiversity) and their mode of valuation; the socioeconomic environment; the agrarian structures and the means of production which have communities as well as social infrastructures. Secondly, it was a question of reviewing the activities of all kinds led or potential, and their effects on the standard of living of the local populations. The adopted methodology has been based on the approach of the livelihoods, which has the advantage to suggest a coherent approach of analysis of all the aspects considering, in particular the vulnerability, the assets, the policies, the institutions and the implemented strategies to remain. The adopted methodology led to realize participative cards and cards GIS of the relief and the natural resources. Population was investigated and interviewed with actors of various institutions. Finally focus-groups were led in a different way with the men on one hand, and the women on the other hand. It was called on to certain tools of participative research. The main results showed that the living conditions were appreciably improved with the made realizations: electricity, drinkable Water supply, roads, tracks, schools, antierosive arrangements, tree-dwelling plantations, renovation of the network of irrigation, subsidy of the population by a caprine (goat) livestock and a beekeeping, trainings of communities in particular social marketing, environmental education and sorting of waste, led by the breeding, the tourism, the manufacturing of cheese and food hygiene.

Keywords: *Sustainable development, basic communities, mountain, management, livelihoods, Algeria.*

MOUNTAIN FARMING IN AUSTRIA

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Abstract

For decades, the mountain regions in Austria have been of regional, social, environmental and economic relevance. The European Union has ranked them among the most disadvantaged areas for agriculture. Nevertheless, in mountainous regions, 'disadvantaged' is not synonymous with marginal. On the contrary, agriculture is central to mountainous regions. In Austria the mountain area makes up 70% of national territory and 50% of the utilised agricultural area. Mountain agriculture is largely family farming. It is as diverse as the myriad mountain landscapes available, but at the same time, there are also commonalities to farming in lowland regions. With this in mind the research questions are: (i) what are the characteristics of family farming in mountain regions and (ii) how do they differ from agriculture in lowland regions? Following some definitive remarks on family farming and the classification of mountain regions, this paper outlines the situation in Austria using select key indicators from the agri-structural data of the Integrated Administration and Control System and income data, 2014. Next, certain characteristics are highlighted using select data from the survey 'Life and working conditions of female farmers in Austria' conducted in the year 2016. When analysing the agriculture in mountain and lowland regions we employed descriptive statistics. Based on the findings, we try to give some suggestions on the need for further research and on future perspectives for both mountain and lowland agriculture.

Keywords: *Agriculture, lowland regions, mountain regions, Austria*.

WOMEN‘S ROLES IN AUSTRIAN AGRICULTURE

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Abstract

For ages, family farms have prevailed and are particular to Austria. Since work both on and off the farm and family life are combined, the role of women in agriculture is a complex one. They are mothers, wives, farm managers, partners, labourers, creators of their own branches and employed off farm. Analysing the roles of women in agriculture is more complicated than it may initially appear. Official agricultural statistics give a very limited image. Statistics on women are only available in connection with the ownership, the management and the labour force. Our knowledge of women in agriculture is largely derived from national studies and statistics as well as (periodic) surveys. With this in mind this paper aims to determine the roles performed by female farmers in agriculture according to their activities on and off the farm. Following a literature review, this paper covers an in-depth analysis of women’s roles in agriculture based on data from official statistics and select data from a survey done in 2016 throughout Austria. In this respect, this paper contributes to the gender debate in agriculture and to our knowledge of the role of women in agriculture. This paper re-affirms the essential role of women in agriculture and tries to give some suggestions on the need for further research and future perspectives.

Keywords: *Agriculture, roles, women, Austria.*

POTENTIAL AND INSUFFICIENTLY REPRESENTED MODALITIES FOR FINANCING OF AGRICULTURE IN THE ENTITY OF THE REPUBLIC OF SRPSKA (BOSNIA AND HERZEGOVINA)

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Abstract

In order to achieve an adequate business results in agricultural production, the primary task is to provide financial resources on time. This task is achieved through the development of various forms of financing agriculture. Current funding modalities that have a significant share in total financing are not sufficient to meet the needs of an agricultural producer. Accordingly, in the paper the potential and insufficiently represented modalities were analysed, the establishment and development of which would significantly improve the financing of the agrarian sector. The results of the survey indicate that the Agrarian Bank have not been established yet on the territory of the Republic of Srpska, and agriculture as a branch of economy is not an attractive sector for foreign direct investments, since their share in total foreign direct investments is only 1.60%. The securities market is not sufficiently developed, and only the Banja Luka Stock Exchange operates with them. A similar situation is with other analyzed modalities that exist but with insufficient participation in total financing of agricultural production.

Keywords: *financing of agriculture, funding sources, Republic of Srpska, Bosnia and Herezgovina.*

AGRO PROCESSING COMPLEXES: A BOON FOR RURAL ECONOMY IN PUNJAB, INDIA

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Abstract

An agro processing complexes (APCs) is a centre where primary processing of two or more durable crops is done. In the Indian state of Punjab, mostly these crops are wheat, paddy, oilseeds, pulses and dried spices. These complexes have been quite successful in rural areas of Punjab (India) helping in augmenting farmers' income and generating employment. To study the technological, social and economic impact, a survey of the existing APCs was made during March-April, 2016. During the survey and study, it was found that in most of the APCs, the installed machinery included wheat flour mill (*Atta Chakkis*), mini rice mill, oilseed expeller and grinder for spices. Wheat flour mill was having highest capacity utilization (73 %) followed by oilseed expeller (50 %). Nearly 42 % of the total cost was used for construction of the shed and rest for machinery. All the APCs were having wheat flour mill whereas only 50 % were having rice mill. About 70 % of the APCs were having monthly profit of Rs. 70,000-80,000/- (Indian Rupees). These agro processing complexes have been found to be technically feasible, economically viable and socially acceptable models.

Keywords: *Agro processing complex, Capacity utilization, Machinery, Primary processing.*

PERSPECTIVES FOR BEEF CATTLE PRODUCTION AND SALES IN LATVIA

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Abstract

Production of beef cattle is one of the most prospective agricultural industries in Latvia. This consideration could be made based on the following preconditions - suitable climate conditions, suitable land areas for beef cattle production, gained management experience, rational opportunities for industrial by-product (manure) use and a wide range of opportunities to increase product sales both in the domestic and foreign markets. In Latvia, the beef cattle industry showed increase during 2011-2015, which had been supported by the positive outlook for beef cattle farming in the entire European Union (EU) market, intensification of rural area diversification in accordance with increased requirements for agricultural land management as well as economic considerations. The topicality of the research is determined by the trends of the beef cattle market, which are assessed as stable in the whole world. In the EU, the number of slaughtered cattle has increased by 4%, while meat production – by 3.70%. The total number of live cattle exports in the EU Member States has also increased by 7.30% during the last five years. In Latvia, the transition to beef cattle farming is stimulated by low milk prices and the limited milk sales market, where there is a tendency that many dairy farms have started parallel beef cattle farming. The aim of the research is to explore prospects for the production and sales of beef cattle in Latvia. The specific tasks of the research: 1) to characterise trends in the production and sales of beef cattle in the world and the EU; 2) to explore the conditions that influence the production and sales of beef cattle in Latvia; 3) to determine the prospects for the production and sales of beef cattle in Latvia. The research results shows dynamic changes in beef cattle production in Latvia. In the in the period 2011-2015 the key trends of which were as follows: with the number of beef cattle farms increasing insignificantly, the number of beef cattle and the number of beef cattle herds increased fast.

Keywords: *beef cattle production, beef sales, production and consumption balance, price of beef, Latvia.*

THE EFFECT OF RURAL TO SEMI-URBAN TRANSFORMATION ON LIVELIHOODS - USING A LIVELIHOODS INDEX

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Abstract

In the past 50 years, excluding populated cities, the majority of areas in Lebanon have shifted from rural to semi-urban. The main drivers of this transition are increased access to education and technology, coupled with the development of the private sector, as well as internal and external factors like the civil war and the Syrian crisis. To determine the consequences of this transition on people's lives, a livelihoods index study will take place in one particular area of Lebanon; Kobayat – Akkar, one of the largest villages in Lebanon. The stakeholders taking part in this study are people who have experienced both the rural and the semi-urban periods, e.g. farmers, business owners, head of municipalities, etc. The study will include quantitative and qualitative data collected in the field using one questionnaire to draw a comparative analysis of before and after assessments. For the qualitative data collection, a Likert scale will be used to translate the qualitative answers into numerical figures. The findings of the study will shed the light on the difference between the indexes of this same area, Kobayat, both as a rural and as a semi-urban agglomeration. The study will also provide details about how each kind of capital (natural resources, economic, social, human and physical) has been negatively or positively affected as a consequence of this transition.

Keywords: *Livelihoods capitals, rural, semi-urban, index modification.*

EVALUATION OF LAND USE AND AGRICULTURAL PRODUCTION IN THE DEVELOPMENT AREA OF THE MAJOR CITIES OF LITHUANIA

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Abstract

Recently, especially big concern is that the consequences of the development of suburban areas are usually manifested by the reduction of productive agricultural land area. Agriculture in Lithuania is very important not only for enshrining agricultural traditions, but for the national economy as well. The tests involved suburban sub-districts bordering the three largest Lithuanian cities (Kaunas, Vilnius, Klaipeda). The study found that in suburban areas the influence of urban development on the use of agrarian land areas was manifested in the fact that they have been suffering from the decrease of agricultural lands, farms and the number of domestic animals more rapidly than in other areas. During the ten-year period in Vilnius, Kaunas and Klaipeda districts the area of the used agricultural land decreased by an average of 4.2 percent (throughout Lithuania it increased by 7.2 percent.), the number of farms producing crops decreased by 36.6 percent (in Lithuania – by 32.5 percent), the number of cows kept in farms decreased by 39.6 percent (in Lithuania – by 21.8 percent.). The average area of legally registered agricultural plot of land in Vilnius district is only 2 hectares, in Kaunas district – 2.2 ha, in Klaipeda district – 2.1 hectares. Such kind of fragmentation of the fields and agricultural land plots, the increasing concentration of the population as well as the rapid decrease of agricultural land areas with negative impact on agricultural development potential in these areas occurring due to the decline in urbanization and self-renaturalization of land, determine peculiarities of the use of agrarian landscape features. Therefore, according to the territorial planning documents, the layout of areas used for agricultural activities in these areas and farm land holdings prospective limits formation must be provided for intensive agricultural activities through creating opportunities for agricultural traders to specialize in horticulture, gardening, and livestock farming, combining land users' preferences and legal requirements for fertile agricultural land preservation.

Keywords: *land use, agricultural production, suburban areas, territorial planning.*

THE ROLE OF INNOVATION ON COMMERCIAL FARMS IN POLAND

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Abstract

Changes in relations between production factors necessitate surveys into their effect on the total value of production. This paper aims to determine the extent to which the involvement of production factors in the production process, in particular in connection with progress, that is, broadly interpreted innovation, had an influence on the value of production of specific size farms determined based on cropland area. The surveys were based on figures recorded for individual commercial farms registered in the database of the Polish Farm Accountancy Data Network (FADN). It ensured the methodological uniformity of data used in this paper. The analysis of the production process on farms was carried out by means of the Cobb-Douglas (C-D) production function method. The study makes it possible to evaluate changes in the productivity of production factors on commercial farms in years covered by the surveys. The flexibility of relations between total production in PLN (Polish Zloty) and production factors, i.e. labour output in man-hours and total costs in PLN, was analyzed. Changes in the management effectiveness of commercial farms which occurred when Poland joined the European Union were evaluated. According to the survey, the level of technical and organisational progress was the highest on farms with the largest cropland area, i.e. 30 =< 50 ha and more than 50 ha, as well as on farms with the smallest cropland area, i.e. less than 5 ha. The size of the farm sufficient to satisfy the requirement of farming products is 10=<20 ha of cropland and 20=<30 ha of cropland.

Keywords: *agriculture, commercial farms, Poland, production factors, innovation.*

SOCIO-CULTURAL ROLE OF GREEN AREAS IN THE RURAL DEVELOPMENT

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Abstract

Contemporary village space is "multi-layered" and it consists of the forms, functions and historical structures and new elements, which are important in the creation of its future image. The research focuses on the analysis of the Polish countryside (Warmia and Mazury Region) in terms of the use of green areas in social and cultural development. During the study, the directions of villages development under the Rural Renewal Program in the context of improving the quality of inhabitants life and alternative forms of development were analyzed. The research was based on the goals of the village network and the results of existing spatial and social development initiatives. The examples of actions connected with protection and the landscape shaping as well as designing of green areas are also indicated. It is hypothesized that rural areas may compete for large urban structures as spaces for peace and health (so-called green therapy) in the future. The research, analysis and design tasks started in 2013 and they are still continuing. So far 6 from 80 villages participating in the rural renewal program since 2012 have acceded to the full research project and participated in planning process (Stare Siedlisko, Nowe Monastarzysko, Żytkiejmy, Wójtowo, Ruszajny, Kronowo). While additional studies, including a fragment of the village were taken in more than 20 villages.

Keywords: *rural renewal program, green areas, village space, design.*

THE ANALYSIS OF THE PROJECTS IMPLEMENTED BY MEASURE 313, IN TIMIS COUNTY (WEST ROMANIA)

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Abstract

Measure 313 "Encouragement of tourism activities" falls under Axis III - "Improving the quality of life in rural areas and diversifying the rural economy" and has as general objective the development of tourism activities in rural areas that contribute to increasing the number of jobs and alternative incomes, as well as increasing the attractiveness of rural space. The financial support of Measure 313 was allocated from the European Agricultural Fund for Regional Development. Eligible beneficiaries were: Micro-enterprises (private equity companies, including craft and consumer cooperatives that have set up activities related to rural tourism in the constitutive act); Individuals (not registered as economic agents) who, until the date of signing the grant agreement, will be authorized with a minimum status of authorized natural person; Communes through their legal representatives, as well as intercommunity development associations made only between the communes; NGOs. As a result of the analysis of the projects submitted on Measure 313 "Encouragement of tourism activities", on 30.06.2011, in Timis county the number of submitted projects was only 50 (226 in the whole 5 West region), of which only 18 (out of 113 from total region) financing contracts, so the absorption level being 0.02% of the total public expenditure allocated at country level. Thus Timis County was ranked second to last in the four counties that form the Region 5 West Romania. In addition to these data, the paper also presents the distribution of projects submitted and concluded on localities, value, domain (public or private), as well as demographic details of legal representatives of applications for funding (age, gender, training, etc.).

Keywords: *funds absorption, tourism activities, financing contracts, Timis County.*

IDENTIFICATION OF THE IMPORTANCE OF EUROPEAN PROJECTS IN THE DEVELOPMENT OF RURAL COMMUNITIES IN TIMIS COUNTY, IN ROMANIA

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Abstract

The opportunity represented by the European funding, which the Romanian rural and urban system of settlements was able to benefit through European programs, was a topical element. In order to identify the importance and role of European projects in the development of rural communities in Timis County, we conducted a study through a qualitative analysis. In conducting this analysis we used an application of an interview guide to the local authorities, mayor or deputy mayor, from 22 communes of Timis County. The Interview Guide has 4 distinct parts: Sustainable Development / Rural Development, National Rural Development Program / Operational Programs, Development Issues and Perspectives. As a result of the analysis, it was observed the maximum exploitation of the opportunities offered by the projects with European financing and the focus of the interest in the directions established as priority by the European Union only in some communes. The paper presents the number of applications submitted, as well as the title of the project and the extent to which these applications have been submitted. Also, there is the respondents' answers to the reasons why they did not apply for funding, as well as their response on the role of European projects in the development of their rural communities. As a result of the implementation of the European projects, there are changes in the rural area, which make the rural space a tempting space with facilities similar to those in the urban area, but there are problems like lack of jobs, in some areas insufficient infrastructure development, lack of projects and means of capitalizing the agricultural products.

Keywords: *Rural community, opportunity, role, development, Timis county.*

THE STRATEGY OF AGRARIAN BRANCH SUSTAINABLE DEVELOPMENT IN INDUSTRIALLY DEVELOPED PERM REGION (RUSSIA)

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Abstract

The basic theoretical and practical statements of sustainable development strategy of agriculture and rural territories in industrially developed regions on the example of Perm Region (Russia) are considered in given article. The author estimated the influence of industry development and urbanization process on agrarian branch of the region. Existing and new support measures promoting the development of different kinds of the enterprises in Perm Region are observed: for farmers, co-operatives and large farms with industrial type of agricultural production. The priorities of the current system of state support for agriculture are observed. Efficiency estimation of various forms of agrarian enterprises is given. The reasons for different levels of efficiency are identified, the classification of strategic directions for the implementation of investment projects in the Perm Region is proposed. The model of further development of agriculture and rural territories taking into account the production influence, urbanization process and productive forces distribution was elaborated. The promising trends of agrarian branch development of the region, the main directions of strategic investments are defined and based.

Key-words: *agrarian enterprises, management model, industrial strategy, farming strategy, rural territory, sustainable development.*

IMPORTANCE OF THE NON-AGRICULTURAL SECTOR FOR RURAL DEVELOPMENT OF THE AREA OF FRUŠKA GORA (VOJVODINA PROVINCE, SERBIA)

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Abstract

Current global trends in the development of rural areas are increasingly developing in the direction of strengthening the role of the non-agricultural sector, which is synchronized with the development of agriculture. The objectives of this work were aimed at identifying the presence of non-agricultural activities in the area of Fruška gora (Vojvodina Province, Serbia), and their impact on rural development in this area. A survey was conducted in 2014 in the area of Fruška gora in order to achieve the objectives of this research. The research analyzed the attitudes of 117 residents of the area from different socio-economic categories. The sample of the respondents was relatively balanced by gender (53.8% females and 46.2% males), with greater participation of young and middle age respondents (aged under 50 years). The SPSS statistical package was used for the purpose of the statistical analysis of the obtained data. The research results show the positive orientation of the respondents regarding the economic importance of non-agricultural activities in rural development, as well as the development of agriculture. In this context, a significant number of the respondents highlighted tourism as the most important non-farm activity, and then forestry, fruit and vegetable processing and catering. The results indicate that there is a variety of choices for the respondents regarding the importance of certain forms of tourism for rural development in this area (agrotourism, sports and recreational tourism, wine tourism, religious tourism etc).

Key words: *non-agricultural sector, rural development, tourism, Fruška gora, survey.*

SOCIOECONOMIC CHARACTERISTICS AS A DEVELOPMENT FACTORS OF RURAL AREAS OF AUTONOMOUS PROVINCE OF VOJVODINA (SERBIA)

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Abstract

Vojvodina is a rural area that is located in the northern part of the Republic of Serbia. The authors analyzed seven administrative districts of Vojvodina which meet the criteria for classification at NUTS 3 level. The research had two objectives: (1) determining socioeconomic disparities as a development factors of rural areas of Vojvodina (at the level of administrative districts); (2) clustering of Vojvodina`s districts based on selected socioeconomic indicators. The following socioeconomic indicators were used for comparison of Vojvodina`s districts: population density, dependency ratio, the share of the population with secondary, higher and university education, as well as the average net salary. Authors ranked Vojvodina`s districts for two reference periods (2010 and 2015), using the obtained values of selected indicators. Statistical software Statistica 13.2. was used for the purposes of the cluster analysis, and the results were displayed in the form of dendrograms. The results showed that there is an imbalance of development in Vojvodina`s rural districts in the context of selected socioeconomic indicators. In accordance with this, the authors concluded that rural area of Južnobački district had the most favourable socioeconomic profile. By contrast, two rural districts of Banat (Severnobanatski and Srednjebanatski) had extremely unfavourable socioeconomic characteristics. The authors estimate that there will be no drastic changes in socioeconomic characteristics of Vojvodina`s districts in the coming period.

Keywords: *socioeconomic indicators, rural districts, Vojvodina, cluster analysis.*

THE POTENTIALS FOR ORGANIC PRODUCTION OF SERBIA AND OTHER EUROPEAN UNION (EU) CANDIDATE COUNTRIES

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Abstract

Organic agriculture is an important element of agricultural and environmental policy of the European Union (EU), which aims to ensure the sustainability of agriculture and environmental protection. In this paper, the authors analyzed the potential for organic production of countries that are candidates for membership in the European Union (Albania, FYR Macedonia, Montenegro, Serbia and Turkey). The authors analyzed three characteristics for observed countries manifested during the second decade of the XXI century: 1) legal framework and support policy, 2) agricultural area for organic production (including those areas that are under conversion), 3) other areas that are in a broader context classified under organic areas, 4) the number of participants in organic production (producers, processors, importers and exporters). As a source of data, the authors used information available from: Research Institute of Organic Agriculture (FiBL), International Federation of Organic Agriculture Movements (IFOAM), as well as data from the Ministry of Agriculture and Environment of the Republic of Serbia and the Republic Institute for Statistics of Serbia. The research results showed that the greatest potential for organic production has Turkey. Turkey has the highest representation of agricultural organic areas and the most developed network of participants in organic production. After Turkey, significant potential for organic production has Serbia, which recorded the highest growth of organic agricultural areas, and FRY Macedonia with the largest total organic area.

Keywords: *Potentials, Organic production, European Union candidate countries, Serbia.*

VALUE CHAINS OF FOREST PRODUCTS FROM ALPS OF ALBANIA

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Abstract

In this paper we present the results of a survey from AUT in the wild forest products sector from Alps of Albania. The Alps of Albania have a rich biodiversity with a long history of collection and use of forest product. The paper presents an analysis of forest product commercialization using value chain method. The analysis is useful in determining the importance of stakeholders or individuals, such as collectors, processors, enterprises and exporters in driving the trade in wild products from North of Albania. The aim is, first of all, to generate an overall picture of the rather heterogeneous and large group of companies working with forest product. The objective is to gather information on how the companies feel about certain issues related to the forest product sector in Alps of Albania.

Keywords: *value chain method, forest products, Alps of Albania*.

THE EFECTS OF MOUNTAIN TO MARKETS PROGRAMME ON ECONOMIC GROWTH IN RURAL ALBANIA

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Abstract

The Mountain to Markets Program (MMP) focused on mountain areas development through a programmatic investment approach by means of increased access to markets, technical know-how and finance. The program was considered as a package of poverty-reduction measures based on participatory and systematic identification of investment opportunities in poor mountain areas and it was implemented in 4 regions in Albania. In this paper we assess the effect of MMP on rural economic growth in general and specifically on poor rural people in terms of quantifiable and non-quantifiable direct and indirect benefits, including incremental changes in agriculture/livestock and enterprise production, income and revenue due to changes in cropped area, animal yields, agro-processing and marketing. The methodology included a mixed-methods approach using both quantitative and qualitative methods. The research was nested in a multidisciplinary approach, drawing on expertise from economists, agricultural experts, and social scientists. The impacts of MMP have been measured by assessing differences in outcomes between areas and farmers "prior" the implementation of the program and "at the end" the program. Analysis indicates that MMP can be considered as highly influential in addressing the needs of peoples foreseen as direct program beneficiaries. Through different activities and measures, MMP supported the farmers in increasing the quantity and the quality of the agricultural product, paying a special attention to the values chain. By increasing the revenues, income and profits of both, the producers and processors, it helped in reaching the final aim; poverty reduction in the targeted regions.

Keywords: *Agriculture, Development, Income, Poverty, Value Chain.*

PRODUCTION RISK AND ADOPTION OF DRIP IRRIGATION TECHNOLOGY BY FARMERS IN WESTERN MITIDJA, ALGERIA

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Abstract

Adoption of drip irrigation in Algeria is very low and a potential exists to increase its adoption. Since 2000, the Algerian government seeks to encourage the development of drip irrigation technology. The aim is to improve the output, increase incomes and save irrigation water. A field survey was conducted in three districts to determine the major factors influencing farmers' adoption of drip irrigation and to draw conclusions that will help in developing policy and institutional interventions to encourage the adoption. In this paper, we study the effect of production risk on irrigation technology choice among farmers, using a sample of 150 farms located in Mitidja, Algeria and discrete choice models. The empirical results demonstrated that farmers choose to adopt the drip irrigation technology in order to hedge against production risk. The results also showed that educated farmers, age, experience, land holding size, with credit access, receiving extension services, and living in districts with more adopters have a significant role in the decision to adopt drip irrigation technique. The reported constraints experienced by farmers include rainfall, clogging of drippers, high initial cost, inadequate subsidy, difficulty in getting subsidy. These results will help to prioritize the factors that affect adoption decisions and provide insights for improving the crop and water productivity.

Keywords: *production risk, irrigation, technology adoption, policy, Algeria.*

CLIMATE CHANGE AND AGRICULTURAL AND RURAL POLICIES IN ALGERIA

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Abstract

The acceleration of the climate change, joined to the growth of the population and the income, threatens everywhere the food safety and natural resources. Forward plannings based on the climate change so make press important risks on the ecosystems and the agricultural systems in the countries of the Maghreb of which part is Algeria . The model MAGICC (Hulme and al, 2000), centered on this region, indeed estimates a reheating of the order of 1°C between 2000 and 2020 and a disturbance of the pluviometric regimes with a downward trend of the order of 5 at 10 % in these countries. The phenomenon of climate change will lead (drive) first of all to a reduction of the availability in water for the pluvial and irrigated agriculture. It should also drive to an acceleration of the erosion, to a degradation and salinisation of the soils, to a fall of the agricultural yields in plains and to a reduction of the fodder potential in mountainous zones and steppes. In the face of this situation and within the framework of its Revival Agricultural and Rural Policies, Algeria launched in a process of mitigation of the risks and the adaptation of its development programs. It set up on the other hand a National Plan Climate (PNC) and submitted its Planned Contribution Determined to the National level (CPDN/INDC) at the time of the ratification of the Agreement on Climate change (CC), before its coming into force planned in 2020. For the questions of mitigation of the risks on natural resources and of adaptation of its agriculture, Algeria thus committed: - a strategy of planning and sustainable development of forest resources (zones of mountains) and steppes resources (steppe zones); - a strategy of lute against the desertification; - a policy of the water; - projects of rural integrated development (PPDRI); - an agricultural development policy and of food safety. The present communication has for objective to present the current conditions of the Algerian agriculture in front of risks of Climate change as well as the policies and the major strategies to face these risks. It will also determine which is the level of implication of Algeria in the process of mitigation and especially adaptation and impact strength of its policies and programs of agricultural and rural development in front of risks connected to Climate change. It will propose at the end a series of recommendations in touch with the structural, economic and institutional conditions of the country.

Keywords: *Algeria, Climate change, Mitigation, Adaptation, Agricultural and rural policies.*

TRADITIONAL LEAFY VEGETABLES: A BUSINESS OPPORTUNITY FOR FRAGILE AGRO-SYSTEMS IN NORTH BENIN

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Abstract

Traditional leafy vegetables (TLVs) are known for their importance in contributing to food security, high nutritional, nutritional and therapeutic values, participation in the environmental sanitation of cities and the generation of supplementary income that can be devoted to of non-food expenditures. Despite this importance, TLVs are very poorly integrated into the market gardening system in Northern Benin, while demands remain uncovered in urban areas. The objective of this article is to understand the reasons for this gap between the supply and demand of TLVs in North Benin. To do this, the comprehensive approach was adopted and was based on participatory observations and unstructured interviews with actors in the production, marketing and consumption of TLVs. It appears that the explanatory reasons for the gap between the supply and demand of TLVsin North Benin vary from one link to another. For producers, the weak existence of the market, the perishability and the low income linked to the TLVs are the main reasons for their low prioritization in the market gardening system. Traders, for their part, feel difficulty in sourcing TLVs during the dry season. Consumers estimate that they consume at least once a week the TLVs but they also have difficulty in sourcing during the dry season. They also incriminate the quality of the TLVs produced and then emphasize the non-existence of ready-to-eat forms of TLVson the market, which reflects the weakness of the market gardening system to satisfy the existing demand. The study leads to the need to develop market models for TLVs that meet consumer needs and link rural to urban areas in order to facilitate a sustainable improvement in the income of the actors in this upstream sector and the food availability of downstream consumers.

Keywords: *Traditional leafy vegetables, Benin, model of marketing.*

A SURVEY ON CONSUMERS'ATTITUDES AND PREFERENCES TOWARDS ORGANIC PRODUCTS IN THE OF REGION BANJALUKA, BOSNIA AND HERZEGOVINA

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Abstract

According to the International Federation of Organic Agriculture movements (IFOAM), organic agriculture is a production system that maintains the health of the land, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of resources with adverse effects. Organic production methods imply the use of natural substances and procedures, and limit or eliminate the use of synthesized agents. The subject-matter of the research was attitudes, preferences and motivations of consumers to purchase and use organic products. The aim was to assess the extent to which the consumers in our region were informed about organic products, as well as to assess the attitudes of the consumers towards organic production. The survey was conducted in the region of Banja Luka (Entity of Republic of Srpska, Bosnia and Herzegovina), using a simple random sample. The survey was designed using a structured questionnaire of 19 closed questions. The data were analyzed using statistical methods. The results show that the market of organic products in the region of Banjaluka is underdeveloped and emerging. The majority of the consumers are neither familiar with organic labels nor have the knowledge of organic production. Most consumers think buy organic produce, even though they have no real confirmation that these products have been in deed certified and manufactured in accordance with the principles of organic production. The results show that there was a potential for buying organic products if the market would offer a better supply, but buying organic products also depends to a large extent on the product price andliving standard in general.

Keywords: *organic agriculture, organic products, consumers' attitudes and preferences, survey*.

SOCIO-ECONOMIC STRUCTURE OF FAMILY FARMS IN POPOVO FIELD (BOSNIA AND HERZEGOVINA)

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Abstract

The social and economic picture of family farms in the Popovo field (Bosnia and Herzegovina) is analyzed in this paper in order to collect basic data on the family farms and prospects of their development. The Popovo field covers an area of 4500 hectares fertile land, and extends between the municipality Ravno and Ljubinje and city Trebinje. The socio-economic analysis was based on a survey implemented in 2016 and 2017 and is statistically processed. Mostly, owners of the farms took participation in the study according to the research, while the survey includes data on members of the same farms as well. The age structure indicates that most of the population engaged in agriculture belongs to the mature and old age and have between 40 and 60 years. About one third of analyzed members of family farm owners have high school education, and only a small part stand out with high or higher education. Data show that in this example of a family farm, families with large number of members are included, confirmed as successors for agricultural production. Respondents were asked to indicate the type of income that form the household budget, therefore the total amount of the household budget on family farms in Popovo field has an average of two sources of income. Almost 2/3 of respondents in Popovo field realize more than 50% of the household budget from agriculture.

Keywords: *Agricultural family farms, structure, indicators.*

ENVIRONMENTAL CONFLICTS IN THE APPROPRIATION AND USE OF THE WATER RESOURCE IN THE SUBREGION OF MAGDALENA, (CALDAS, COLOMBIA)

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Abstract

The neo-extractivist model of reproduction and expansion of capitalism in the Department of Caldas (Colombia) is expressed in three main ways: 1) production of agricultural commodities; 2) mining-energy projects, and 3) real estate developments/tourism and hoarding of land. These projects have caused the emergence of a set of environmental and socio-territorial impacts and conflicts of unknown consequences. Whit the objective to find out which are the specific undertakings and how have they impacted on the Caldas department, this paper focuses on the energy generation projects being developed in the municipalities that make up the Magdalena Caldensesub region. In order to do so, first we showed a conceptual reference framework to analyze and problematize the particular dynamics expressed with the advance of the current model of accumulation by dispossession in the region. Second, we described the actors, the repertoires of struggle, the practices of action by the private companies and the resistances of the social organizations in the dispute for the appropriation and the use of the water resource in the zone. The empirical material came from interviews and field observations made in the framework of the Dynamics of Expansion Dynamics project of agrarian capitalism and socio-territorial conflicts in the Department of Caldas during the year 2015.

Key words: *Water resource, energy generation, Colombia.*

A CORRESPONDENCE ANALYSIS OF MOTIVATIONAL FACTORS FOR JOINING AGRICULTURAL COOPERATIVES

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Abstract

The aim of the study was to explore one's reasons for joining an agricultural cooperative. Using the correspondence analysis, this paper focuses on the research on connection patterns of motivational factors for joining agricultural cooperatives in order to identify mutual relationships between members' motives and socio-economic features. The field research was conducted on the sample of 202 shareholders of agricultural cooperatives in five Croatian counties. Descriptive statistics shows that the main reasons for joining agricultural cooperatives are 'safer products placement and market sales' and ' production cost reduction '. The correspondence analysis has confirmed the existence of high inertia within the groups of economic and social motives as well as greater importance of economic reasons for joining the cooperatives. Furthermore, better market placement of agricultural products is the main reason for joining cooperatives among the respondents with full ownership rights, as well as among the respondents having less than five-year experience and lower income from agriculture. The respondents with higher income from agriculture or collaboration with cooperatives were more motivated to reduce their own production costs unlike the respondents with lower income.

Key words: *agricultural cooperatives, correspondence analysis, Croatia, motivation*.

ENOTOURISM AS A SUSTAINABLE ADAPTATION STRATEGY FOR CLIMATE CHANGE FOR SMALL FARMERMERS IN CHILE

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Abstract

Regarding wine production, Chile is the world's eighth largest wine producer and the fifth largest exporter, reaching a market share of 8% by volume of the global international wine market. Despite this undeniable success, the sector faces many challenges, especially in the case of small wine producers. Traditional small wine producers face great competition and had to adapt their strategies to survive. Besides that, they must adapt to the challenges posed by climate change. The climate in the Chilean wine regions is changing interms of temperature and precipitation and it is expected that these variations will continue in the next decades. Enotourism, if properly managed, may play an important role as a climate change adaptation strategy providing agricultural incomes and enhancing the rural development of small farmers in Central Chile. In this study, we assessed the climate and socio-economic drivers of this sector in Chile and the potential of Enotourism to provide economic as well as social and environmental services.

Keywords: *Food waste, Online survey, Household behavior, Morocco.*

ANALYSIS OF SESAME MARKETING CHAINS: THE CASE OF QUARA WOREDA, NORTH GONDAR ZONE, AMHARA REGIONAL STATE (ETHIOPIA)

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Abstract

Ethiopia is among the top producers of oilseeds in the world and sesame is one of the oilseeds for which Ethiopia is known in the international market. This thesis has analyzed the sesame marketing chain particularly the case of Quara Woreda, North Gondar Zone, Amahara Region (Ethiopia). Specific objecties examined the sesame marketing performance, analyzed factors that determine sesame channel outlets choice, and identified major constraints and opportunities of sesame production and supply to the market. Primary data were collected from 120 sample households and 32 sesame traders based on three stage random sampling method. Multinomial logit models (MNL) were employed to estimate the determinants of sesame channel outlet to the market. The results obtained from MNL analysis indicated that age, access to market information, access to warehouse, membership of cooperative and quantity supply to the market were significant and positively affecting level of sesame market outlets choice. The multinomial logit model results also indicated that the probability to choose the cooperatives outlet was positively and significantly affected by access to market information and membership of cooperative compared to traders outlet. Similarly, the probability of choosing Ethiopian commodity exchange (ECX) marketing outlet was positively and significantly affected by age of households, access to warehouse and quantity sesame supplied to the market compared to trader's outlet. In order to evaluate the efficiency of sesame market chain that can have great influence on marketable supply level of sesame, structure-conduct performance approach was adopted. Performance of sesame market chain was analyzed using Marketing Margins supplemented with analysis of costs incurred and gross profits generated for different market chain actors. Based on the study, policy interventions increasing production and productivity, developing and improving infrastructures diffusing market information and cooperative development required to increase marketable supply level of sesame are suggested and forwarded.

Key words: *marketing, marketing outlets, multinomial logit model, margin*.

EDUCATION FOR GETTING COMPETENCE: CASE STUDY IN EDUCATION OF HOME ECONOMICS TO THE MULTICULTURAL WOMEN IN ESPOO CITY FINLAND

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Abstract

The education of Home Economics is an important way to help the multicultural women to accept the new culture. The women are the key persons in families to learn the "strange" new customs and habits of a new foreign country. The children and mothers need education to learn every day common life to survive. The language has been seen very important for communication in the society. The everyday shopping, food production of odd new material need to be taught. In Espoo City there has founded many different clubs and small associations to collect foreign women together to learn the home economics. Espoo City is serving many different ways to the newcomers. The education in these small "clubs" help their competence to solve everyday life. This research introduces the work of one small federation's work during five years. different possibilities for education in this special case will be shown. The federation works as an association in International Federation of Home Economics (IFHE).

Keywords: *Women, multiculture, Home Economics, foreign country, education.*

LABOR-INTENSIVE AGRICULTURE, ENERGY AND ECOLOGICAL ECONOMICS OF RURAL DEVELOPMENT PATHS: THE HERITAGE OF CHAYANOV AND GEORGESCU-ROEGEN

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Abstract

This paper deals with question whether there is only one pathway of agricultural development (intensification by incorporation external inputs) or whether there are other options (labor-intensive agriculture). The aim of the paper is to contrast current deliberations and suggestions of development paths for transition countries, which are primarily given by copying the Western European agricultural development after World War II, with more ingenious ones of Eastern Europe, which have been inherited. Alternatives in rural development, especially when it comes to sustainability, are nowadays frequently demanded and it is a question whether it would be better to refer to Chayanov and Georgescu-Roegen than Luther Tweeten. The focus will be on the role of labor, farmers' objective functions, value added and compensation for eco-system services. For instance, looking at the issue of renewable energy and its use in farming, there is a question if self-employed farmers calculate value added differently than large commercial farms. Using a modeling approach we will show that commercial large-scale farming calculates energy use differently and that Chayanov's theory shades some better light on issues of energy and labor use in agriculture. The intuition is that commercial farms have a tendency to use more external energy than small sized farms. The paper provides theoretical arguments why and how we can show differences. Then the question is who produces more externalities and how policy can cope with externalities. The paper will especially draw on deliberation of Maymuni (2001) who contrasted farming and manufacturing as two opposite concepts.

Key words: *farm structure, energy use, peasant and commercial farm behavior.*

A VIEW ON THE UNINFORMED CONSUMERS TOWARDS QUALITY STANDARDS IN THE CONTEXT OF THE TTIP NEGOTIATIONS

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Abstract

Radio broadcasts, TV shows and online media make a significant contribution to day-to-day consumer information and have a great impact on public opinion. The present study provides an overview of the German reporting about the quality standards of the agri-food industry in the context of the negotiations towards a EU-US Transatlantic Trade and Investment Partnership (TTIP). On the basis of a guided empirical content analysis, 436 publications released via radio, TV or Internet in the period from June 2013 to December 2016 were quantitatively and qualitatively analyzed. The quantitative analysis showed that the agri-food industry was generally of minor relevance in the coverage of TTIP, but focused mainly on quality standards. The term ‘quality and consumer protection standards‘ frequently appeared in the reportings with the topics such as genetic modification, use of hormones, antibiotics or pesticides and the ‘chlorine-washed chicken‘. These are not standards for official definition of the general food law. It was established that all publications lacked information about specific standards. Thus, the quantitative analysis showed a superficial view of quality standards with only symbolic characteristics. The results of the qualitative media analysis indicated a negative picture of the effects of TTIP concerning the agri-food sector and its standards. Due to the complex structure of the globalised agri-food chains, the importance of comprehensive consumer information was highlighted. Overall, German media failed to provide scientifically based information. Unfortunately, they just highlighted the possible negative changes which could be caused by TTIP.

Keywords: *agri-food industry, food safety, quality management, quality standards, Transatlantic Trade and Investment Partnership (TTIP)*

MOBILE APPs FOR 24×7 FARM INFORMATION SERVICE TO FARMERS: AN INDIAN CONTEXT

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Abstract

Knowledge is power in this knowledge society. Farmers always need knowledgeable information for quality seeds, plant protection measures, weed management, weather information, animal husbandry and poultry, market information, crop insurance, crop loans,*etc.* With the advent of android mobile and customized mobile apps, farm technology information is now in the fingertips of the farmers. Government of India through its Digital India Programme is providing the useful information to the farmers in the aforesaid areas by launching a number of mobile apps for the farmers viz. *Kisan Suvidha*, *Pusa Krishi*, *m Kisan Application*, *Shetkari Masik Android App, Farm-o-pedia App, Crop Insurance Android App, Agri Market.* Some other important mobile apps are also developed by societies and corporate sectors for the farmers *viz. IFFCO Kisan*\, *Krishi Gyan*, *Organic Farming*. The major breakthrough of these apps are not only available in the English language, but also available in local languages of farmers (Hindi, Bengali, Tamil, Odia, Telegu, Marathi, Gujarati, Punjabi, Assamese, Kanada, Malayalam, *etc.*). Through these mobile apps farmers receive useful information on local weather condition, crop advisory service based on weather parameters, nearby input dealers, videos on crop production, daily and real time market price of agricultural inputs and their farm produces. All this information is available for farmers in 24×7 mode. These mobile apps are very ease available to farmers from Google Play Store free of cost. Some mobile apps also work in offline condition. Number of studies conducted in India showed that farmers income has increased from 10% to 30% by using the mobile apps. It is also noted that mobile apps using farmers decision making ability, achievement motivation, risk taking ability, cosmopoliteness have improved considerable. Most remarkable result is that a higher number of rural youths are attracted and retained in agriculture.

Keywords: *Mobile Apps., Smart Phone, Farmers, Income, Advisory Service.*

NO ONE KNOWS WHEN DROUGHT WOULD HIT THE LAST SHOT TO RURAL AREAS: INVESTIGATING RURAL DEVELOPMENT EFFORTS UNDER PROLONGED DROUGHTS IN IRAN

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Abstract

Rural areas perform multiple functions including production of food and raw materials, landscape conservation, creating employment opportunities and reinforcement of non-oil-producing economy in developing countries. In this way, agriculture has become the main source of livelihood for rural residents of the developing world. However, increased occurrences of prolonged and severe-sustained droughts have reduced productivity of agriculture and have led to increased water stress, poverty, unemployment, food insecurity and migration. It is while insufficient use of ecological, cultural and social capacities of these rural areas and improper planning for rural development under drought conditions can lead to uncontrollable increase of migration. Therefore, investigating rural development traps under drought is of great importance while few studies have addressed this issue and little is known about the barriers to achieving rural development in drought-prone areas of Iran. This study attempts to fill this knowledge gap through a case study on eastern regions of Fars province, Iran, where the area has suffered from 12 continuous years of drought. The results indicated that though drought has significantly reduced agricultural productivity, all development efforts have been still focused on agriculture sector. Meantime, the pace of development programs has reduced upon water crisis and no fundamental activity, e.g. industrial foundation and tourism promotion, has been started in the region. Moreover, crisis amplification has confused policy makers and no precise and comprehensive drought mitigation program has implemented during these years. In addition to drought, human, social, financial, cultural and institutional factors have had determining roles in development inhibition of the area. Given the interconnectedness of development barriers, multiple obstacles will need to be removed simultaneously.

Keywords: *Rural development, prolonged drought, Development barriers, Mitigation efforts, Iran.*

SAFFRON PRODUCTION AS EXTRA INCOME FOR WOMEN IN LEBANESE RURAL AREAS

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Abstract

Saffron, Crocus Sativus, known as Red gold, is the most expensive spice in the world. It was known since ancient time with the old civilizations, and is still grown in some traditional producing regions: Kashmir in India, Khorasan in Iran, Kozani in Greece, La Mancha in Spain, Taliouin in Morocco, etc. Recently, Saffron is being introduced in several countries where it was traditionally cultivated but was abandoned during last century due economic reasons, mainly in Europe, where some new producers start to launch again its cultivation; France, Switzerland, Italy, England, Spain and Greece, and more recently in Afghanistan and Kosovo with some international funds. In Lebanon, it was considered and promoted as an alternative crop to Cannabis Sativa. During late eighties and early nineties of the last century, Cannabis Sativa was definitely prohibited and existing plantations were destroyed. Despite some promising results of saffron cultivation in Lebanon, this crop was adopted by a very limited number of farmers, thus, we at ARI, elaborated a program to evaluate its production and test some agricultural and management practices to suggest elaborated technical packages to interested farmers in order to reduce to minimum its production cost with a reasonable benefit. We planted some 2000 saffron bulbs in different experimental stations during August- September 2010. Considering the actual situation of general high production cost in the agriculture sector, it is still true that saffron could be a promising crop to improve the economic and social status in rural regions, mainly to empower and enhance the status of women in these areas where the limited number of women activities make agriculture a privileged sector for women to work and contribute more in the production process and generate "easily" an extra income for their household. In these rural areas, Women are the cornerstone of agriculture, and they contribute with their husbands in the cost of living, which is more expensive day after day. The female labor migration to the agricultural sector affects the social and economic role of women. Therefore, the promotion and implementation of women's economic presence in rural areas improves their social role and is more evident than in urban areas. We tested for several years now, different technical packages covering most aspects of Saffron cultivation and production, Corm size, Corm density, different soil types, different localities, different weed management practices etc. in order to propose to farmers a comprehensive, simple, easy implemented and most effective and economically viable manpower and management schemes. The preliminary results of these trials showed that soil solarization was effective for weed control and management, low corm density showed an increase in saffron yield as compared with high density. Corm size was significant in saffron production.

Keywords: *crocus sativus, saffron, rural women, Lebanon.*

FARMERS' TAX OPTIMISATION MODEL

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Abstract

Viable production of food products is one of the priority goals of the EU's rural development policy in the period 2014-2020 for promotion of farm sustainability, progress and integrated growth in rural areas. Support and taxes are the key factors stimulating these processes. In view of the post-2020 changes in the EU rural development policy, taxes in agriculture as an instrument of economic regulation are to become even more important. Specifics of taxation of agricultural business is centred on food assurance and quality, landscape maintenance, promotion of attractiveness of rural areas, preservation of environment and cultural values, assurance of biological diversity, population growth and creation of jobs in rural areas, supply of biofuel, and integration of youth into agriculture. Effective implementation of these directions pertaining to agriculture in terms of taxation is feasible by application of an optimum tax system to agriculture. Analysis of scientific literature has shown that tax systems applied by individual countries of the EU at present do not fully match the criterion of an optimal tax system, and there are certain issues in taxation of farmers' farms that may be classified into four directions: insufficient promotion of investments into human capital by means of taxes, more effective maximisation of welfare functions by tax relief, addressing of environmental issues by means of environmental taxes, and minor effect of farmers' social responsibility on the tax system. Theoretical model of optimal tax system for farmers' farms is to be developed in the research to reflect the solutions to issues mentioned above and important links between the government, farmers, and business enterprises in the common effort to ensure that the issues are addressed. Novelty of this model is manifested in its holistic approach to solution of the issues mentioned by application of tax instruments.

Keywords: *tax, tax optimisation, tax system, farmer.*

BUREAUCRATIC DOMINANCE IN EUROPEAN HIGHER AGRICULTURAL EDUCATION

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Abstract

This research work is produced as a part of doctoral thesis of correlational type, whose main objective is to demonstrate the relationship between the university bureaucracy of international agricultural education as a sociological phenomenon of the domain of domination according to Weber, particularly of the Higher School (ESAB) of the Polytechnic University of Catalonia (UPC) in Spain and its impact on organizational performance, as a reference and example for national agricultural education, particularly the Universidad Autónoma Chapingo (UACh). The results of the research validate the hypothesis: a better bureaucratic management in the context of the Spanish EAS, particularly the ESAB of the UPC, the better organizational performance. Some research results are as follows: Students appreciate more characteristics of a leader related to legal domination, compared to traditional and charismatic. The students show a clear rejection towards the charismatic domination, when politics and government is treated. Students validate more the practices of legal domination, compared to traditional or charismatic, when choosing college positions. The students reject more the bad practices related to the charismatic domination, than those related to the legal or traditional domination. Students value respect, as a representative value of legal domination, in comparison with other values, such as loyalty and humility, related to traditional and charismatic domination, respectively.

Keywords: *bureaucracy, domination, higher agricultural education.*

ECONOMIC WATER MANAGEMENT UNDER CLIMATE CHANGE IMPACT

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Abstract

The recent statistics show a clear downward trend in global and per *capita* availabilities of water due, in particular, to climate change. In addition to the recurring droughts that Morocco experienced during the last two decades, this tendency is accentuated by an unceasingly increasing demand, in particular under the effect of the demographic pressure and the economic development. In a context of scarcity and a limitation of potential resources not yet mobilized, Morocco is confronted with the need of changing its supply policy to a demand management one. The implementation of such policy requires the adoption of new management instruments and new institutional forms of organization. Accordingly, the present study proposes a tool of modeling and decision-making support which integrates the economic, institutional, hydrological and agronomic aspects. The proposed approach is based on optimization techniques and positive mathematical programming to calibrate an empirical model. Using climate change impact scenarios, this integrated economic model is tested for the basin of Souss-Massa. These simulations include changes in water availability and economic conditions, as well as demand management policy. The study results show that the demand management policy at the river basin level should take into account the regional specificities. The basin's water resources are substitutable and water management policy cannot ignore this aspect and should integrate surface and groundwater resources at the same time. In drought conditions, the water marginal value 'shadow price' increases considerably such that water pricing policy alone cannot result in a rational and a sustainable use of the resource.

Keywords: *Water resources, climate change, drought, River basin, integrated economic model, scenario, shadow price.*

MICRO-CREDIT AND FARMER PRODUCTIVITY IN OSUN STATE IN NIGERIA

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Abstract

This research studied micro-credit and farmers' productivity in Osun State, where 140 respondents were interviewed using structured questionnaires. Micro-credit sources identified in the study area were money lenders, rotational savings associations, farmers in partnership business, banks, co-operatives, non-governmental organizations and the Ministry of Agriculture. The obtained data were analyzed using descriptive and the Tobit regression model. The Tobit regression model showed that there was a highly significant relationship between farmers' age (0.989), household size (0.623 significant at 1%), farming experience (0.858 significant at 5%), loan conditions (1.29 significant at 10%), interest rate (0.387 significant at 1%) and loan duration (0.281 significant at 1%) that affect giving loans to farmers to increase their productivity (income). The mean amount of loans given per season is within the range of ₦20,000 to ₦100,000 and the loan duration is one year. The income generated by the farmers was used as a measure of productivity and the minimum income per season was ₦ 20,000. The interest rate, which was expected to have a negative relationship with loan giving, was however positively correlated, based on the Tobit regression results. It was deduced that majority of the farmers patronize informal loan sources, perceiving such loan conditions and periods highly favourable in comparison to formal sources. However, the amount of loans taken from informal sources is smaller than that taken from formal sources.

Key words: *Micro-credit, Productivity, Tobit Regression model, Osun State, Nigeria.*

RAINWATER HARVESTING FOR SUSTAINABLE AGRICULTURAL DEVELOPMENT IN PAKISTAN

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Abstract

Agriculture grasps a paramount importance in the Pakistan economy. It is the mainstay of living of people in rural areas, where 62% of the total population resides. Thus, agriculture contributes significantly to rural development in Pakistan. Despite being the largest sector of the economy, food production per unit area is low in Pakistan, particularly in the rain-fed areas. An important reason for which is, inter alia, the inability of farmers to meet *'crop water requirements'* in the rain-fed agriculture. This paper attempts to pinpoint the role of rainwater harvesting (RWH) schemes in increased food production in rural areas in northwest Pakistan. Drawing on field surveys, it is depicted that water shortage in the area is primarily due to the absence of large-scale irrigation arrangements. Nonetheless, farmers have developed small-scale RWH schemes such as channels, ponds, and bunds in their villages. The results of the paired-samples t-test indicate that yield was significantly higher in the areas where farmers used water from RWH schemes. However, the storage capacity of these schemes was low; and hence, the farmers were unable to irrigate a large portion of lands. The study concludes that the large portion of uncultivated land could be cultivated if a water shortage problem was resolved through the promotion of community-led RWH schemes in the area. This has important implications for rural and agricultural development, viz. improved living conditions of the farmers through increased food production and its contribution to food security at local and national levels.

Keywords: *Crop water requirement, Monsoon rains, Rain-fed agriculture, Rainwater harvesting, Rural development.*

PARTICIPATION OF RURAL WOMEN IN AGRICULTURAL ACTIVITIES IN SINDH PROVINCE OF PAKISTAN

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Abstract

The rural women participation in agriculture is seldom recognized inspite of their effective role in the development of agriculture in developed as well as developing countries of the world. In order to investigate to what extent rural women participate in agricultural activities, a study was conducted with an objective to identify the role of rural women in agricultural activities in Sindh Province of Pakistan. Data were collected from a random sample of 120 respondents covering three districts, namely Hyderabad, Mirpurkhas and Badin. These districts were selected purposively. Variables such as farm size, ownership status, family income, no. of adult male in the household, time spent in the pre-harvest and post-harvest crop activities of wheat sugarcane and cotton were included. The data were analyzed to detect the significance of these variables in relation to the women participation in agriculture activities. The results of the model employed reveal that women participation in agriculture activities and total income of family had a negative and significant relationship. Similarly, the number of adult male in the household and years of schooling of the respondents have also negative and significant relationship with women participation in agriculture activities. However, the age of women and years of schooling has a significant positive effect on women participation in the pre-harvest activities and post-harvest crop activities. The study reveals that women spent more time in post-harvest activities than pre-harvest activities. The time spent on the cultivation of wheat, sugarcane and cotton is 39 hours, 22 hours and 14 hours, respectively, as compared to hours spent on the post harvest activities of these crops, which are 122, 66 and 34 in the same order. The major problems encountered by the women in discharging their functions included lack of training, insufficient extension services, cultural constraints and financial problems which need to be addressed to improve their efficiency and living standard of their family.

Keywords: *Rural Women, Participation, Agricultural Activities.*

PERCEPTION OF NON-GOVERNMENTAL ORGANIZATIONS REGARDING SUSTAINABLE AGRICULTURE PRACTICES IN SINDH PROVINCE OF PAKISTAN

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Abstract

Pakistan is one of the developing countries of the world. Agriculture is the main stay of the Pakistan's economy in terms of providing food, employment and foreign exchange earnings. The importance of agriculture is apparent from the fact that more than 70 percent of Pakistan's population lives in rural area and agriculture is their main source of livelihood. It contributes 22 percent of the gross domestic product (GDP). Agriculture provides 45% employment of labor force, and 71% population directly or indirectly is engaged in agriculture. Environmentally sustainable agriculture movement is very strong in most developed countries, but it is new in Pakistan. The question is whether or not it is possible to maintain resources, most importantly the soil and simultaneously minimize environmental damages without decreasing gross output and net farm returns. If yes, what extension strategies are to be adopted and what extension education programmes should be framed in order to achieve these twin objectives of environmentally sustainable agriculture. The research work was carried out in Sindh Province. All the major NGO's working on agriculture in Sindh province of Pakistan were enlisted. Ten of them were randomly selected for study purpose. A detailed questionnaire was developed and personal interviews were conducted for collecting data. It was observed, that 60% of the respondents had familiarity with the concept to sustainable agriculture and 65% of the respondents were of the opinion that these practices will support to some extent 75% respondents suggested that Education Extension Program in the field of sustainable agriculture may be introduced, however, respondents suggested various strategies for adoption of sustainable agriculture at grass root level.

Key words: *Sustainable Agriculture, NGOs, Practices, adoption and Agricultural Extension.*

TIME SERIES ANALYSIS OF CAUSALITY RELATIONSHIP BETWEEN CLIMATE CHANGE AND FOOD CROPS PRODUCTION BY VECTOR ERROR CORRECTION MODEL

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Abstract

Developing countries are most vulnerable to climate change and environmental degradation and also coupled by the resource depletion get worse as economic development accelerates as it is a great threat to the food security and livelihood of the growing population in the developing world. The aim of this research was to study the effect of climate change on crop productivity in maize, rice and wheat crops in Mardan, district of central Khyber Pakhtunkhwa-Pakistan. For this secondary, data was collected from the metrological department of Pakistan about the rainfall, humidity and temperature for the last 20 years and production data of maize, rice and wheat form the agriculture statistics book of Pakistan, 2015. Analysis of the data was made with the help of the Vector Error Correction Model. The result pointed that this model is a best fit model for explaining the relationship between the dependent variables. The result is significant for three food crops at different levels of significance and pointed that the climate change affects the crop production and different decreasing trend was noted for the crops production.

Key words: *Climate change, food, crop production.*

FACTORS INFLUENCING THE CHOICE OF BANKS BY FARMERS: EMPIRICAL REASEARCH

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Abstract

Farmers' decisions on the selection of the bank are determined by the characteristics of micro farms, farmers' personal characteristics and behavioral factors. The purpose of the study was to identify connections between different kind of banks and the selected features that characterize farmers. Sets of independent variables were: status and size of the farm, type and value of production, gender, age and farmer's education. The data used were the original data obtained from the field-based empirical research conducted among farmers from the Middle Pomerania region in Poland. In the research problem process, the author used a literature analysis and a data analysis: a descriptive and graphical method of data presentation. The measurement technique was a survey. The research tool was a questionnaire. A multidimensional correspondence analysis was also used in order to isolate the features of the farmers. The analysis showed that the differentiating factor in the study was age, education and sex, and among the microeconomic traits of farms - the value of production. Also, the analysis demonstrated that the services of commercial banks were used by respondents aged at most 45 years, with secondary agriculture education, leading crop or animal production. The services and products of a cooperative bank primarily were benefitial for men, who drive farm and reach a production of between 30 - 50 thousand zloty. Those were people aged over 45 years with secondary education or less, head of the holding in which the production carried out was of the mixed type.

Keywords: *rural areas, farmer, commercial bank, cooperative bank, age* .

INFLUENCE AND IMPACT OF STRUCTURAL ADJUSTMENTS IN AGRICULTURAL ADVISORY SERVICES IN ROMANIA AS EUROPEN UNION MEMBER STATE

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Abstract

With an outstanding reform of the public agricultural advisory services in Romania structurally changing the former setup during the first EU programming period 2007-2013 new challenges must be tackled. The large demand for technical support from the farming communities did not decrease over the analysed period, although an important number of structural changes occurred in agriculture and rural economy. Moreover, the need for specific advice and consultancy has diversified with the particularities of different possibilities to access the measures of the National Rural Development Programme 2007-2013 active until the end of 2015. The major change was not facing the structures as organisations and types of service provided but rather their readiness and the future orientation of the consultants. A large and general demand for business/technical consultancy in preparation of the future project applications for agriculture, particularly agricultural modernisation investments, and other types of support for the diversification of the rural non-agricultural economy was formulated and present on the market. With the technical consultancy as an eligible expenditure and one of the few accepted afore the submission of the application and with the large financial amounts involved in remunerating the service an important number of consultants were shifting from the agricultural extension work towards a consistently higher motivation offered by this opportunity. The balance and the changes induced by these developments are the core research question of the present paper with the aim of highlighting several findings useful for the further technical adjustments of both types of consultancy services.

Keywords: *advisory services, consultancy, RDP projects*.

FARMING SYSTEMS DEVELOPMENT IN MOUNTAIN AREAS OF ROMANIA

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Abstract

The development of areas facing natural constraints represents a desideratum of politics at European and national level due to the importance these areas have from territorial and population point of view. Romania is one of the countries with the largest surface ranked as areas facing natural constraints because of the natural limitations imposed by climatic and bio-physics conditions that are less-favoured to agricultural activity developed in best conditions. Less-favoured mountain area of Romania represents a territory with high economic, social, cultural and environmental potential. In order to assure the increase in attractiveness and the durable development of mountain area, the capitalization of resources, stabilization of population, maintaining the customs and the cultural values, increasing the economic power at local level without affecting the ecological balance preserving the environment are needed. Mountain areas facing natural constraints from Romania represent 20% from territorial-administrative units, 30% from national territory and 20% from country population. Due to the natural constraints, the agriculture is the main activity in mountain rural areas. In this paper we present the farming systems from mountain areas and the measures in order to support the development of agricultural activity.

Keywords: *Farming systems, Mountain areas, Development.*

THE STRATEGY OF INVESTMENT ATTRACTIVENESS OF AGRARIAN ENTERPRISES ON THE NORTHERN COAST OF THE BLACK SEA

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Abstract

The authors have studied the elements of strategic planning for the activities of wine-growing and wine-making enterprises, closely related to increasing of the investment attractiveness of enterprises. The paper finds a place of investment attractiveness of the strategy in the system of strategic planning of companies, providing an effective flow of financial resources, positively reflected in the financial condition of specific businesses. The paper proposes a method of the evaluation of the effectiveness of strategic planning in wineries, taking into account the investment attractiveness of the enterprises. It also identifies key elements of such evaluation, taking into account the specific characteristics of viticulture and wine-making and giving recommendations for assessing the effectiveness of strategic planning at the pre-planning, planning and post-planning stages. The authors also developed a system for selecting a set of evaluation indicators, taking into account the constraints in order to determine the investment attractiveness of an agricultural enterprise and the activation of investment in agriculture, included in the system of strategic planning of enterprises.

Key words: *Investment attractiveness, Strategic planning, Viticulture, Wine-making, Investment.*

THE EVOLUTIONARY STRATEGY OF DIGITAL TRANSFORMATION OF RUSSIAN AGRICULTURE

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Abstract

Revolutionary transition to a digital economy will shift a paradigm in the development of agriculture and design new forms of relations between participants of agro market and new technologies of investment in agriculture. However, ensuring a transition requires technology foresight not only in technical, but also socio-economic aspects, as well as the study and assessment of the current agricultural potential, constraints and risks of implementation. Sustainable agriculture is possible just in the close and inseparable linkage between territory, technology, people, social, law and administrative relations. The paper describes the main tasks of Russian agriculture using the existing features of its agroresources, specialization and climatic features. Tasks include, primarily, the emergence of digital markets and infrastructures in agriculture (an expansion of the number of digital operators serving agricultural production, and forms of their interaction with agro producers), and a wide range of remote services (teleagronomy, telemedicine and televeterinary, remote monitoring in the storage and logistics of food) and new approaches to sustainable rural development. Secondly, it is necessary to provide scientific-based modeling, forecasting and planning agriculture development through the design and verification of digital modeling environments using the technologies of "big data". In circumstance of a total monitoring of environment, vital infrastructure, agricultural machinery and equipment collected data should be as accessible as possible. Thirdly, it is necessary to take into account the reduction in rural population and increasing demands on quantity and quality of food. It requires a sequential automation of the maximum aspects of agricultural activities on the basis of establishing digital infrastructures, modeling, forecasting and planning.

Keywords*: sustainable rural development, digital market, sustainable agriculture, evolutionary strategy.*

DAIRY PRODUCTIONIN SERBIA POMORAVLJE REGION

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Abstract

Dairy production does not directly depend on climate and other natural factors. Its specificity is that it depends on a number of other factors. Gross margin of dairy production depends not only on simple products, produced volumes of milk and the price, but it includes other elements such as the amount of milk that is consumed in the household, for calves aged up to 10 days, the manure, the premium for milk as the amount of incentives for quality breeding cows (subsidies). This means that the value of production, in addition to the quantity and quality of milk affects the prices of all the elements involved, which are largely determined by measures of economic policy, and producers have no influence. The quantity and quality of milk are most affected by the quality of food, but also maintain optimal reproductive cycle in cows, increasing fertility and reducing mortality. Data for gross margin (GM) calculations were collected through the questionnaire from dairy production farms in Pomoravlje region (period 2011-2014). GM was calculated as the total value of a production line subtracted by the direct costs for the production line in question. Milk yield per cow is a parameter that has minor fluctuations in the observed period, which shows little variation coefficient of only 4.76%. The average milk yield per cow was 5,626 liters per year and has a tendency to a slight increase at the rate of 0.22% per annum. The price of milk is also as the yield, stable and given the negligible value of the rate of change of only 0.05% could be said to be at a constant level. It was present slightly higher fluctuations of yield and price (Cv = 13.93%), and a slightly more pronounced increase at an average annual rate of 0.76%. The average value of gross margin amounted in the reporting period about 636 EUR/cow. Gross margin is also characterized by significant fluctuations because the value of the coefficient of variation in this parameter much higher than in milk yields, prices and variable costs (Cv = 33.75%). GM in the production of cow's milk is characterized by the tendency to decrease to an average of 0.64% per annum. Observed variations in GM have been confirmed by the results of t-test. The maximum value of the GM was in the initial year of monitoring (2011), and this value is significantly different from the value in the control year, 2015, when we have recorded a much lower value. On the other hand a significant difference compared to the control one has realized the value of the GM in 2014 which is the lowest value of the monitoring period.

Key words: *gross margin, dairy, milk, variable costs, yield, price.*

SOUR CHERRY PRODUCTIONECONOMIC PARAMETERS IN THE REPUBLIC OF SERBIA POMORAVLJE REGION

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Abstract

Sour cherry, after the plums and apples, holds third place in Serbia in terms of volume and area of production. Serbia, within the Central European Free Trade Agreement (CEFTA) countries, is the largest exporter of sour cherries (approx. 4.4% of total exports of fruit in Serbia). Farmers need to be introduced to the economic effect of a sour cherry production and gross margin (GM). GM is a quick and efficient indicator for comparing production lines in different conditions and it was used as an indicator of economic effects of production. Data for GM calculations were collected through the questionnaire from sour cherry production farms in Pomoravlje region (period 2011-2014). For calculating the basic elements of gross margin, the following data were used: data on yield and price, by-product price, quantity and value of fertilizers, pesticides, and fuel, and costs for contracted services. GM represents the total value of a production line subtracted the direct costs for the production line in question (purchased inputs). Price of sour cherry shows considerable variability during the observation period (Cv= 54.95 %). The average price of sour cherries in the reporting period was approx. EUR 530 / t, while the maximum price recorded was almost twice higher (1,016 EUR/t). In contrast to the yield, price showed significantly more pronounced tendency to increase - an average annual rate of 9.72%. The average value of total variable costs was approx. 1406 EUR/ha. A positive feature of variable costs at the sour cherry productionshows a tendency to decreasewith the average annual rate of 2.64%. The average value of gross margin in the observed period amounted to approximately 4,013 EUR/ha. The value of rate of change shows that the gross margin year on year growth record and an average of 11.71% annually.

Key words: *gross margin, sour cherry, variable costs, yield, price.*

GROSS MARGIN AND ECONOMIC PARAMETERS IN GRAPE PRODUCTION IN SERBIA POMORAVLJE REGION

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Abstract

Serbia has a good climate and soil conditions for growing grapes. In Serbia three growing regions are determined, with the 22 rayon and 77 vineyard areas, for the production of grape and production of a wine with the geographic origin. Based on the Census of Agriculture in 2012, it was found that 13% of the total number of farms, are engaged in grape wine production, but 92% of the production is performed at less than 50 acres area. In the production of grapes, family farms are in the first place to a larger extent, and then a small number of large wineries. Data for gross margin (GM) calculations were collected through the questionnaire from grapewine production farms in Pomoravlje region (period 2011-2014). For calculating the basic elements of gross margin, we have used data on yield and price, by-product price, quantity and value of fertilizers, pesticides, and fuel, and costs for contracted services. GM was calculated as the total value of a production line subtracted the direct costs for the production line in question (purchased inputs). The yield of grapes in the period 2011-2015 was approximately one tonne higher than the average yield of grapes in Serbia according to official statistics. Average yield was determined to 8.2 t / ha, and varied in the range from 5.5 t / ha up to a maximum of 12 t / ha. This presents relatively normal fluctuations in the yield, which indicates the value of the coefficient of variation (Cv) of 16%. Also, grape yield had a tendency of a slight decrease and the average annual rate of 0.3%. The average price of grapes in the reporting period was at about 390EUR/t. A positive value indicates that rate of change of prices in the reporting period tends to increase to 0.77% per annum.The variable costs (VC) of the grape production in this period were on the average 1,408EUR/ha. VC shows a tendency to decrease to 0.56% per year and was the most stable production parameter (Cv = 10.53%). Reduction in variable costs and the relative stability of the characteristics are favourable for the producers of grapes. Gross margin of the grape production in households was observed at an average level of about 1,760EUR/ha. Characteristic gross margin is significantly higher variability in relation to other parameters indicating the value of Cv of almost 31%. Although there are fluctuations in the values of gross margins, this parameter tends to increase at a rate of 1.06% per annum.

Keywords: *gross margin, sour cherry, variable costs, yield, price.*

AGRICULTURAL LAND PRICE –CASE OF SLOVAKIA

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Abstract

The aim of the paper is to present research results in the frame on agricultural land price in Slovakia and the current situation in the agricultural land market. The authors tried to identify the most significant factors affecting the prices of agricultural land. Based on the data collected during 30 months, the authors came to a conclusion that the most significant factors were the offered plot area, the proportion of the offered area on the total area of the land plot, and the distance of the offered plot from a city district. All of these factors have the positive effect on the land price.

Key words: *Agriculture, land price, Slovakia.*

COMPARATIVE ANALYSIS OF RESOURCE UTILIZATION IN RAISING DIFFERENT GOAT SPECIES: ÇANAKKALE CASE (TURKEY)

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Abstract

The main aim of the enterprise is to maximize the profit. Profit basically could be identified as the difference between income and outcome. Increase in income or decrease in outcome can raise the profit. Because of law of diminishing return in agricultural production the increase of yield is limited. Therefor it is crucial to minimize the expenses or decrease the outcomes. Different goat species are raised in Çanakkale province (Turkey). In the context of this study, an economic analysis was executed in Saanen and Hair goat enterprises. Data was collected from 32 Hair Goat and 32 Saanen Goat raising enterprises in Çanakkale province by face to face questionnaires. Production cost and income has been compared and analyzed by using Partial Budgeting method. In both productions process labor costs were high. In terms of per milk cost, Hair goat production was found more profitable. But this production process is based on grass land and much more animal amount. Even the high labor costs in Hair Goat enterprises per profit gain are higher. This is because of high amount of animal and milk production in these enterprises. Thus in terms of working capital and in terms of labor of Saanen enterprises, Hair goat enterprises were determined as profitable.

Key words: *Goat, economic analyses, survey, Turkey.*

INTERNATIONAL COMPETITIVENESS OF THE TURKISH OLIVE OIL SECTOR

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Abstract

Turkey, with its olive oil production and export potential, is one of the leading countries in the world. For this reason, it is a direct contribution to the economy of the country which helps Turkey maintains the sustainable competition superiority in changing international trade conditions in the olive oil sector. The objective of this study was to analyze the international competitiveness of the Turkish olive oil sector with different indicators. Balassa and Vollrath Indexes were used for measuring the international competition level of Turkey in the olive oil sector. In addition to these indexes, other indicators such as the export/import ratio, import penetration ratio, openness to international competition, net export ratio and specialization coefficient were also used in the study. The aforementioned indicators were also used for making comparisons with important producer countries. One of the main results of the analyses was that Turkey has important advantages in the global olive oil trade. However it does not have sufficient international competitive advantage when compared with other leading countries in olive oil production and exportation.

Keywords: *Revealed Comparative Advantage, Balassa Index, Vollrath Index, Specialization Coefficient, Net Export Ratio.*

THE EFFECTS OF GLOBAL CLIMATE CHANGE ON AGRICULTURAL PRODUCTS AND FARMER AWARENESS

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Abstract

The agriculture sector, which is dependent on natural conditions, is greatly influenced by this change, showing the greatest impact of climate change as global warming. In order to be protected from these effects, the farmers have to take the production decisions carefully. Because of the global warming effect of drought, it may be necessary for the farmer to change the crop, planting and planting times. This is related to how well the farmer is aware of climate change. Measures to be taken against risk are related to the perceived dimension of risk. Although many studies have been carried out on climate change and agricultural effects, there are few studies on the farmer's awareness of climate change. Farmers do not know what they need to do to be protected from these effects, even if they are aware of the effects of climate change, temperature increases, drought, and precipitation reductions. In this study, the effects of climate changes on the agricultural sector have been researched by making use of statistics and studies on this subject and trying to explain the importance of the risk perception level on the farmers in order to minimize the effects.

Key words: *Global climate change, Agricultural products, Awareness, Risk perception, Farmers.*

FOOD LOSSES AND WASTE IN FRUITS AND VEGETABLE AGRI-FOOD CHAIN IN TURKEY

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Abstract

Global food losses and waste has received much attention recently in the world. According to FAO, from almost one third of food produced for human consumption approximately 1.3 billion tonnes per year is either lost or wasted globally. Reduction of food losses and waste is now presented as essential to improve food security and to reduce the environmental footprint of food systems. The objective of the study is to assess food losses and waste at critical points in the agri-food chain for fruits and vegetable in Turkey. Different climatic conditions in the country allow production of various kinds of fruits and vegetables, on average 15 million tons of fruits and 27 million tons vegetables are grown in Turkey. This places Turkey on 3rd place in fruit production and 4th place in vegetable production in the world. Among the fruits, the first three places in terms of production value are taken up by grapes, olives and apples. Tomato is the leading crop in vegetable production. Tomato is followed by green pepper and cucumber. When all fruits and vegetable types and varieties are considered, Turkey is one of the top 10 countries in the world. In this study, the methodology developed by FAO and the Swedish Institute for Food and Biotechnology was used. To determine food losses and waste as well as critical loss points along supply chains, in-depth interviews were done with key experts from fresh fruit and vegetable sector. In these interviews, semi-structured questionnaires were used. These questionnaires set five stages for losses emerging in agri-food chain as: 1.Agricultural production, 2.Postharvest handling and storage, 3.Processing and packaging, 4. Distribution, 5.Consumption. According to research results, food losses and waste ratios along the agri-food chain respectively were determined as 20%, 8%, 10%, 10% and 5%. The highest rate of loss was observed in the first link of the chain which was agricultural production. The structural problems of Turkish agriculture such as small and fragmented farms, low cooperation level were the main causes of losses at this stage. Losses at the agricultural production chain were mainly associated with farmers' traditional methods, habits and practices. Losses emerge from farmers' unwillingness to seek information related to agricultural production. Furthermore agricultural production was generally undertaken by elderly people since rural youth were willing to immigrate to urban areas and prefering to work in non- agricultural sector.

Keywords: *Food loss and waste, Agri-food chain, Fruits and vegetable, Turkey.*

GENERAL OVERVIEW OF SOCIAL ASSISTANCE POLICIES FOR RURAL AREA IN TURKEY

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Abstract

Today, the understanding of the social state has come up again with different aspects. Under the concept of social state, social justice and peace are the basic priorities. In recent years, changes and developments in economic structure have caused imbalances in income distribution. This situation has come with negativities in social structure, as a result, changes and developments are needed in social state understanding. While the urban areas benefit from the advantages of industrialization, rural areas have become disadvantaged against this situation. In Turkey, from past to the present, rural development activities were carried out within the framework of social state understanding. With the importance given to rural development in the world in recent years, economic, social and social development efforts towards the rural areas have increased and social assistance policies have begun to be implemented in different dimensions and characteristics. In Turkey, especially social assistance policies are implemented for economically less developed rural areas. These social assistance policies cover housing, nursing, family needs, education and aid for disabled people. In this study, general structure and characteristics of these social assistance aids will be analyzed in comparison with local institutions social aids.

Keywords: *Social assistance, Rural development, Turkey.*

OBSERVATION OF CONSTITUENTIONAL SPECIALITIES IN SAANEN GOAT ENTERPRISES: STUDY CASE ON ÇANAKKALE PROVINCE IN TURKEY

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Abstract

There are constituentional and substitutional relationship between production processes in agriculture enterprises. Substitutional relations are between the production processes that uses the same sources. Constituentional relations are when the one's output is used as the other's input. In an agricultural enterprise that has high constituentional relation production process cause decrease in production cost and efficiency of usage of sources. This situation increases the growth slope. The growth rate of the enterprises forms the base of regional and national development. For this reason in this study the constituentional speciality of Saanen goat breeding in Çanakkale in Turkey has been observed.

Key words: *Saanen Goat Breeding, production Costs, Constituentional.*

THE CONTRIBUTION OF GEOGRAPHICAL INDICATIONS IN SUSTAINABLE RURAL DEVELOPMENT (EVIDENCE FROM NORTHERN ALBANIA)

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Abstract

Geographical indications (GIs) are a form of protective labeling used to indicate the origin of food and agricultural products. The role of protected geographical indicators as a promising sustainable rural development tool is the basis for this paper. The protection of geographical indications is a new practice and much research is still required for both sides of the debate. The focus of this debate is: Can a Geographical Indication (GI) which indicates that a certain product originates from a certain region with a given quality being attributable to its place of origin, become a tool to promote socio-economic livelihoods of rural communities? The research method employed for this study is a qualitative research approach. Two potential GI products are used to investigate the benefits brought to rural areas through the protection of GIs. The case studies include the GIs Chestnut and chestnut honey in two geographical Albanian areas, Tropoja and Reç of M. Madhe areas. Twenty-five in-depth interviews were conducted in 2016 for this study. The study identifies predominantly indirect links between GIs and sustainable rural development (SRD), through economic and social benefits brought to rural areas by the GIs investigated. This finding suggests that GIs are worthwhile for implementation in Albania as a rural development tool. The initiative for development of GI products was undertaken by BiodivBalkan Project, implemented in the North Albania, aiming to link biodiversity with development of quality signs (GIs) in order to support rural development and poverty reduction in the poorest areas of Albania.

Keywords: *Geographical Indications, Agrobiodiversity, Rural development, BiodivBalkan Project.*

CURRENT FUNDING SOURCES FOR AGRICULTURE IN THE ENTITY OF REPUBLIC OF SRPSKA (BOSNIA AND HERZEGOVINA)

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Abstract

Fulfilling the needs of business entities with the basic activities in the field of agriculture certainly implies securing a sufficient amount of funds in both quantitative and qualitative terms. For the agrarian sector financing is one of the limiting factors and for this reason in the paper we analysed the current funding modalities of agriculture in the Entity of Republic of Srpska (Bosnia and Herzegovina) and pointed to their specificities, advantages and disadvantages. The results indicate that there are four most important modalities that are present individually or in combination with a different participation in the total financial system(self-financing,state-supported financing, financing by the loans from the commercial banks and financing through donations) as well as the importance of development of potential modalities and those which still do not have a significant share in the financing (foreign direct investments (FDI), securities, and concessions).

Keywords: *Financing of agriculture, sources of funding agriculture.*

INCENTIVES FOR INVESTMENTS IN IRRIGATION – RESULTS IN THE REPUBLIC OF SRPSKA BETWEEN 2009 AND 2015

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Abstract

Due to the growing influence of global climate changes, which is manifested in agriculture in longer periods of droughts during the growing season, irrigation in agricultural production becomes a necessity. The Republic of Srpska (RS), entity in Bosnia and Herzegovina (BiH), following the examples of developed countries, encourages investment in the construction and modernization of irrigation systems for fourteen years now as a part of the measures of its agricultural policy. The RS provides subsidies as a part of the investment costs of building the infrastructure and procurement of equipment for irrigation, trying to motivate farmers to invest in this direction. The research topic is the analysis of the implementation of the measures of subsidizing individual investments in irrigation in the RS in the period 2009-2015. The aim of the study was to determine the results of the application of the afore mentioned measures under several characteristics, per hectare and per beneficialry. The research results indicate that the greatest interest for irrigation was recorded in the regions that have intensive agricultural production and the level of investment varies from year to year, not only as a result of the interests of farmers, but also as a result of different size of funds available in the agricultural budget for that purpose. Average, the lowest investments per unit area were achieved in the group of municipalities with developed agricultural production. However, it included the largest investments by the user, due to the fact that those were investments within larger areas, which led to lower costs of the investments per hectare. Subsidy is based on the size of the investment and the number of users, i.e. it is paid as a percentage of the recognized investment costs (20-45%), but it was 34.5% in average.

Keywords: *The Republic of Srpska, irrigation, investment in irrigation, investment subsidy.*

ROLE AND IMPORTANCE OF SMALL AGRICULTURAL HOLDINGS IN LATVIA

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Abstract

An opinion is being popularised nowadays that the future production of food and other goods may be only industrial, large-scale and uniform. The Common Agricultural Policy of the European Union and the Rural Development Programme of Latvia has directed agricultural and rural development towards this particular goal, focusing less on small agricultural holdings. Four land reforms in Latvia have been implemented within a relatively short period (during the last century), making significant effects on the size of farms and agricultural development in Latvia. The research *aim* is to identify the role of small agricultural holdings by examining the historical background of formation of agricultural holdings in Latvia. Based on data provided by the Central Statistical Bureau, small agricultural holdings, in terms of utilised agricultural area and standard output, accounted for 90% of the total agricultural holdings in Latvia in 2010 and 2013. However, the number of such farms decreased year by year. For this reason, the preservation and development of small and medium agricultural holdings in the rural areas of Latvia is an essential matter. The insolvency and liquidation of small agricultural holdings can only increase the number of poor families, depopulation and unemployment in rural areas and in Latvia as a whole. In Latvia, small agricultural holdings are defined as those with an annual standard output of less than EUR 15 000 and an agricultural area of less than 50 ha. Small agricultural holdings perform not only economic but also ecological functions, and they play an essential social role in rural development.

Keywords: *small agricultural holdings, land reform, standard output, Latvia.*

MODEL OF REGIONAL DEVELOPMENT THROUGH RURAL AREAS AS RURAL ECONOMIC DEVELOPMENT POLES: CASE OF THE REPUBLIC OF MACEDONIA

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Abstract

During the regional economic development certain rural areas become attractive owing to concentration of economic activity through different channels of economy of scale, external economies and agglomeration of economic activities. Its has been formed like rural areas with certain formative economic development forces. Furthermore, their "spread effects" from growth poles cause induced growth in the remaining peripheral areas. These rural areas as a rural regional development poles are able to generate respectable economic impact in the geographical area becoming pole of the rural development in a certain rural region. In the Republic of Macedonia the model of regional economic development trough rural areas as a rural economic development poles need to have a major role in the formulation of a rural regional economic development policy, respecting the specificities of the regional development of small and underdeveloped economy.

Key words: *rural areas, rural development poles, regional development*.

INFLUENCE OF GENDER EQUALITY ON SUSTAINABLE DEVELOPMENT OF VILLAGES IN THE REPUBLIC OF MACEDONIA

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Abstract

Sustainable rural development is important for the society, posing a challenge for rural households, in terms of ensuring continuous improvement of the quality of life and wellbeing for present and future generations. The equal participation of rural women and men is crucial for sustainable development but still remains a complex goal. The aim of this paper was to review the status of women in rural areas from the perspective of gender balance and to highlight the role of the equality in the activities related to sustainable rural development. The methods of descriptive statistics of data were used to process the official data for gender balance in the labour market. Additionally, a field interview for gender equality in decision-making and management was conducted on 140 rural households in Macedonia. The findings demonstrate that the employment rate of rural women amounted to 34%, what is lower than the employment rate of men in rural areas (66%). According to the structure of the status of employees in rural areas, women in the "unpaid family workers" category amounted to 8%, compared to women in urban areas amounting to only 1%. Additionally, the data from the field research show that rural women have very low levels of decision-making in the family and leadership of family businesses, especially in the rural areas with predominantly Muslim population. By identifying gender-differentiated opportunities and constraints, policy makers in Macedonia can develop gender-responsive actions that can lead to more effective measures for the overall improvement in natural resources management.

Key words: *Gender, Rural women, Sustainable rural development, Macedonia.*

ANALYSIS OF THE ECONOMIC EFFECTS OF DRIED PLUM PRODUCTION ON FAMILY FARMS

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Abstract

The traditional model of fruit drying in Serbia is founded upon small family dryers, which are used for drying plums and occasionally apples. Such model features a sustainable energy supply due to utilizing biomass as an energy source. However, a serious technological disadvantage of the model is reflected in the employment of direct drying, which inevitably results in fruit oxidation. Changes in consumers' habits, accompanied by increased sanitary and health requirements, have made this technology obsolete on the market. The contemporary production of dried fruit necessitates "friendly technologies" with a stable and inexpensive energy support. Therefore, a number of researches at the Faculty of Agriculture in Novi Sad examined the adoption of friendly fruit drying technology with a sustainable energy supply. Consequently, the solution was found in the combined fruit drying technology powered by renewable energy sources. Using the combined technology, the production of dried fruit in small drying facilities on family farms can be very profitable. On the basis of the financial analysis of dried plum production, the total and variable costs were calculated for a dryer with a capacity of 450 kg of fresh plums per day. The contribution margin was computed as the difference between the total sales revenue and variable costs, whereas the profit was calculated as the difference between the value of production and total costs. The cost price of dried plum halves was 187.3 RSD/kg (1.52 €/kg). A retail price of 504 RSD/kg was set for dried plum halves by adding an average trade margin of 20% and a value-added tax of 20% to a wholesale price of dried plum halves totalling 350 RSD/kg. The calculations showed that a gross margin of 843,960 RSD (6,861 EUR) and a profit of 729,480 (5,931 EUR) was generated during 40 days of production, using the given purchase and selling prices.

Key words: *dried plums, cost price, contribution margin, profit, Serbia.*

MANAGEMENT OF GREENHOUSE CROP GROWTH SYSTEM

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Abstract

In recent decades, the greenhouse area has risen to grow the vegetables, ornamentals and fruit crops at worldwide year-round. Today, the greenhouse farming has been carried out in modern production facilities. The greenhouse management is a key factor at all growing stages, different timescales and market patterns. The sub-sectors such as energy, climate and water-fertilizer crop quality, and pest-disease in greenhouse can be integrated under management concept. In this paper, the hierarchical manager method is proposed for profitable and sustainable crop growth and production in greenhouse. This method involves three layers named as climate and nutrition manager layer, crop growth manager - layer and tactical manager layer. The greenhouse management is carried out based on fast crop dynamics (transpiration, photosynthesis, and respiration), and slow crop development (crop growth and fruit changes). High-tech greenhouses can be managed according to the strategic, tactical and operational levels based on computer, sensors, communication, and software sub-systems.

Keywords: *Greenhouse, Greenhouse management, Multilayer hierarchical control.*

DETERMINATION OF NITROGEN STATUS OF SUGAR BEET USING MOBILE OPTICAL SENSOR

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Abstract

Recently, measurement of the optical characteristics of vegetation at specific wavelengths has been adopted for N status assessment in various crops. Optical sensing instrumentation can be used to calculate vegetative indices, which are indicators of a plant's photosynthetic potential and above ground, living biomass. Development of NDVI for prediction of sugar beet yield and quality during the growing season would be of value to producers and industry. During the growing season, monitoring the status of the plant in sugar beet production system will enable farmers to improve nitrogen management. The main objective of this study was to determine in-season nitrogen status in sugar beet using the mobile optical sensor. An experiment was established to determine the effect of nitrogen on root yield, sugar content and α-amino N content using a randomized block design by applying five different rates of nitrogen (0, 60, 90, 120, 150 kgN/ha) for two sugar beet varieties. The amount of 115.64 kgN/ha was determined as economic optimum nitrogen rate when quadratic polynomial model was used to describe the relationship between nitrogen and root yield, sugar content, and α-amino N content. The use of NDVI values were proposed 93 days after sowing at approximately 1486 CGDD. Thus, N status in plants and in-season N requirement could be determined taking advantage of the relationship between N rates and NDVI values. So, the variable rate nitrogen fertilization process can be realized as an important element of precision agriculture. Environmental pollution will be minimized due to increasing nitrogen use efficiency.

Keywords: *Sugar beet, Nitrogen management, Optical sensor, Variable rate nitrogen application, root yield, sugar content.*

CLASSIFICATION OF AGRICULTURAL TRACTORS BASED ON ENERGY EFFICIENCY IN TURKEY

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Abstract

Testing tractors to make sure that they meet their advertised performance claims has been a central focus of the manufacturers and farmers for decades. Agriculture uses energy directly as fuel to operate machinery and equipment and indirectly in the fertilizers and chemicals produced off the farm. There has been a continuing growing interest in fossil fuel economy and reducing greenhouse gas emissions in terms of economic and ecological reasons. A general goal of more energy efficiency encourages the use of tractors with better energy performance in agricultural operations. Tractor manufacturers report that customers are beginning to factor in fuel as part of the tractor-buying equation. Farmers are adding fuel efficiency to their list of purchasing criteria. In this study, an efficiency index, using the specific fuel consumption as a benchmark was applied to 58 tractors for classification of agricultural tractors derived from official tests that fallow the OECD (Organisation for Economic Co-operation and Development) codes. The survey was based on the results of tests conducted between 2010-2014 by TAMTEST (Agricultural Machinery Test Center of Ministry of Agriculture in Turkey). 58 models of tractors from 13 different tractor brand ranged from 10 kW (13.4 BG) to 119.3 kW (160 BG) sold in Turkish market were taken into account for classification. 24 tractors were fallen into average energy index category. 18 tractors out of 58 tractors are ranked above the average energy efficiency level. 15 tractor among the 55 tractor are found to be under the average energy efficiency level. This index provides a good option for comparing the fuel-efficiency tractors under standardised conditions. Additional testing is needed on other models of tractors from other manufacturers in order to determine whether the trends found in this study pertain to all tractors or if they are specific to this tractor model and manufacturer.

Keywords: *Tractors, energy efficiency, consumption rates, engine.*

KALAKALAN SA ANA KALANG: MARKETING STRUGGLES OF FARMERS AND TRADERS IN BRGY. BUKAL, NAGCARLAN, LAGUNA, PHILIPPINES

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Abstract

Social struggles of agricultural marketing in the Philippines' rural communities remained understudied despite its viewable effect to the patterns of local rural development and agricultural systems. Given the complex and disorganized nature of the country's agricultural marketing, the smallest stakeholders playing in the grassroots—farmers and small village traders—were usually overlooked with regards to the problems they face, especially on pre-production, production, post-production and postharvest, transportation, and sales stages. Interviews among selected farmers and traders in the community of *Barangay* Bukal, Nagcarlan, Laguna, Philippines and key informants were conducted to elicit a narrative representative of the community's social panorama. Collectively, results show that issues on variable climatic conditions, overproduction, flexible market prices and price margins dictated by the middlemen and big traders, and land tenure surfaced as Bukal farmers' and traders' major struggles against economic good. Although the Local Government provided ample technical-political-cultural support to address these issues, the root cause of this struggle was not responded thoroughly due to the degree of willingness of farmers to reorganize their paths towards a more successful agricultural marketing activity.

Keywords: *Agricultural marketing, middlemen, Philippines, social struggles.*

LAND CONSOLIDATION – A NECESSARY CONDITION AND IMPERATIVE FOR AGRICULTURE PRODUCTION DEVELOPMENT

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Abstract

Agriculture production development in contemporary social and economic conditions shall be considered from aspect of its economic efficiency. Fragmented holdings which characterize the state of the art of the agricultural property represent the basic and biggest source of superfluous and unnecessary costs of agricultural production. Inadequate infrastructure for agricultural production (property disposition and irrigation systems) as well as unsolved property rights are the crucial factor of inefficient land utilization and consequently reduce the competitiveness of agricultural products on the market. Economic dimension of land consolidation is also not negligible. Bearing in mind today's low price of geodetic works in region it may be considered as a chance for providing land consolidation at a very reasonable costs. Also, low cost of land consolidation is a chance for return on investment in a short period of time with additional benefits of solving property rights and establishing an updated cadastral system. In this paper the model for calculating return on investment period of land consolidation process was used in order to highlight the economic benefit of land consolidation. In spite of the fact that obstacles in land consolidation process exists it is proved in theory and practice that land consolidation remains the best method for agriculture development and land management. This paper aims to point out the significance of land consolidation as a factor of agricultural production development with special emphasis on the state in entity of the Republic of Srpska (Bosnia and Herzegovina).

Key words: *Land consolidation, Agriculture development, Parcel, Irrigation systems, economics.*

SHORT-TERM DIAMETER AND HEIGHT INCREMENTS OF ORIENTAL BEECH AND BLACK ALDER SEEDLINGS IN PURE AND MIXED SITES

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Abstract

Black alder (*Alnus glutinosa* subsp. *barbata* (C.A.Mey). Yalt) enriches soil with nitrogen through a symbiotic relationship with bacteria found in its roots. Because of this characteristic, alders can be evaluated as a natural fertilizer. In this study, it was investigated whether there could be an important contribution of black alder to the increment of oriental beech (*Fagus orientalis* Lipsky) when oriental beech and black alder were grown together in afforestation sites. In 2014, 15 sample plots each of them 200 m^2 were established according to the randomized complete block design with five replications in Arhavi district of Artvin province located in the eastern Black Sea Region of Turkey. Five of the sample plots were planted with 2-year-old eastern beech, 5 with 1-year-old black Alder 5 mixed with 1-year old alder and 2-year old eastern beech. Seedlings were planted with 1m x 1m spacing distance. Changes in root collar diameter, height of all seedlings in pure and mixed sample plots were measured in the fall annually. An Independent Samples T Tests was conducted to determine whether planting type had a significant effect on differences in root collar diameter and height of seedlings. Assessment made two years after planting showed that black alder grows more rapidly than oriental beech in pure sample plots. It has been determined that the growth (increment of root collar diameter and height growth) of oriental beech seedlings is better in mixed black alder and oriental beech plots compared to pure oriental beech plots.

Key Words: *Black alder, Oriental beech, root collar diameter, diameter increment, height increment.*

THE RURAL SOCIETY IN ALGERIA, BETWEEN THE POLICY OF RENEWAL AND THE PARTICIPATIVE APPROACH

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Abstract

The debate on the rural society has always taken some place in some literature and discussing papers, for the fact that some international institutions and organisms have, already, warned about the disastrous situations of the rural spaces, mainly the question of rural poverty, unemployment, precarity, famines, social exclusion, poor social conditions of life and living, and principally, the lack of opportunities to undertake a serious launch of economic development projects. It is known that the handling of any subject concerning the rural areas is mainly linked to the behavior of the agricultural sector, that is, the exam and analysis of any rural subject and theme is confined in the analysis of agricultural output, productivity, profits, which is completely false and outside the reality, since that the rural sector is dealing, effectively, with agricultural sector, but also, others professional activities, besides the fact that rurality is a field to study the way of life and the behavior of rural households, rural associations, rural administrations, rural spaces and territories. In this case, our concern, through this paper, is to study how the rural population and actors are dealing with the governmental decision to undertake a wide program to develop the rural regions, called the revival of the rural development, knowing that such population has suffered, for a long time, from the marginalization and exclusion, and voluntary lack of serious projects which has resulted in deteriorating economic and social conditions of life, and the rise of a general idea about these rural population, that any other program or project of development is just another idea of the political responsible in order to respect some electoral deadlines, but in any way to develop, seriously, this part of areas. The launch of this project, by the state, is heading to ameliorate the conditions of life of rural households and to give more chances and opportunities to rural actors and agents to choose and undertake their own projects, but the question is to analyze the reaction and behavior of the rural areas towards such program.

Keywords: *Rurality, Algeria, Participative, Decentralization, Renewal, Local knowledge*.

TOWARDS AN INTEGRATIVE ANALYTICAL FRAMEWORK TO MAP SUSTAINABILITY TRANSITIONS IN FOOD SYSTEMS

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Abstract

Transitions to sustainable food systems are considered necessary to address sustainability challenges in industrial food systems – but also to achieve food and nutrition security especially in countries of the South. To facilitate such transitions, we need a thorough analytical understanding of change processes in food systems. Different transition frameworks have been suggested in the literature, with the Multi-Level Perspective (MLP) on socio-technical transitions being the most prominent. While MLP has proven to be a useful heuristic, earlier studies have identified weak points (e.g. regarding agency, power, landscape factors and institutional innovations) calling for the integration of complementary concepts. Moreover, analysing transitions in food systems is especially challenging due to the complexity, diversity, spatial heterogeneity multi-functionality of agriculture and food systems. This paper proposes a framework for the analysis of sustainability transitions particularly in food systems that plugs in elements of the Social Practices Approach, Transition Management, Strategic Niche Management and Innovation Systems. The starting point of the suggested analysis is to map emerging sustainable food systems along the MLP levels of niche, regime and landscape. To better understand processes of creating and developing initiatives in food systems, our mapping relies on Innovation System approaches (e.g. identifying actors and their networks), Transition Management (e.g. niche stabilization and expansion processes) and Strategic Niche Management (e.g. breakthroughs). As wider transitions require a reconfiguration of relevant regimes, interactions across levels are of particular interest. Most of the changes we can observe in food systems are in-the-making, and it is not clear if they have the strength and ambition to change the regime. The Social Practices Approach helps to make niche-regime interactions explicit. Finally, by looking at the impacts and outcomes of change initiatives, we can make statements about the type of transition pathway taken – and whether an initiative has transformative potential or is an incremental adaptation. Further work is needed to refine and test the framework in different contexts both in industrialized food systems and the global South.

Keywords: *Sustainability transitions, Transition framework, Multi-Level Perspective, Food systems, Agriculture*.

LEARNING AGRICULTURE THROUGH FARMER-TO-FARMER VIDEO AND RURAL RADIO TO IMPROVE SMALLHOLDER FARMERS' PRACTICE AND INCOME: EVIDENCE FROM LOCAL RICE PROCESSING IN BENIN

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Abstract

This study deals with the impact of farmer-to-farmer video and rural radio on rice processors' practice and income. Data were collected in the south and north of Benin with 240 rice processors, using structured interviews and weekly report sheets. The double difference model 'Diff-in-Diff' and the Average Treatment Effect (ATE) with the Ordinary Least Squares (OLS) regression were used. Before video shows and rural radio broadcasts, rice processors had less access to formal agricultural learning sources (less than 30%), and used less recommended practice (less than 10%) during rice processing. Rice processors who watched the video or listened to the rural radio broadcasts enhanced their creativity and adapted their learning to their environment by developing appropriate technologies. They improved their rice processing technologies, leading to better quality rice, with better price on the market. Using the ATE model, we noted that video and radio had improved white and parboiled rice processors monthly income for 49 and 9 dollar US respectively for white rice; and 470 and 211 dollar US for parboiled rice. The impact on the revenue gains was more than twice as high for video as for radio. Rural radio seemed less effective than video and its use in agricultural extension requires particular attention. Rural radio broadcasters require sufficient knowledge of agricultural topics and need to be familiar with the local agricultural vernacular in order to deliver appropriate messages. The visual support of video and scripts based on video helped radio broadcasters to streng then their capacities on the appropriate message. Information campaigns using video and rural radio play an important role in informing smallholder rice processors about new technologies that may add value to their production and reduce poverty by positively impacting their practice and income.

Key words: *Survey, video and rural radio, Benin.*

PRODUCTION OF BIOACTIVE CONJUGATED LINOLEIC ACID BY LACTIC ACID BACTERIA FROM TRADITIONAL BULGARIAN FERMENTED PRODUCTS

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Abstract

Conjugated linoleic acid (CLA) is a group of positional and geometric isomers of linoleic acid (LA; c9c12-C18:2). Two of the most biologically active forms of CLA -*cis-9, trans-11* and *trans-10, cis-12* have beneficial effects on consumers related to anticarcinogenic, immune modulation, antiatherosclerotic, and antiobesity activities. Some lactic acid bacteria (LAB) are found to produce CLA in synthetic media or milk. However, most screening methodologies for CLA-producing LAB are laborious, complex and time-consuming. The aim of the present study was to assess the ability of 35 LAB strains isolated from traditional Bulgarian dairy and cereal-based fermented products to convert free LA to CLA isomers (*cis-9, trans-11* and *trans-10, cis-12*) by using a rapid spectrophotometric method. Thirty-five LAB strains were tested, and the applied rapid and sensitive screening approach resulted indetecting16 CLA-producing strains, most of which belonged to *Lb. plantarum* and *P. acidilactici*. Eight of the tested strains converted more than 22% of the LA to CLA in the culture supernatant. The highest conversion capacity of LA to CLA isomers was shown by *Streptococcus bovis* 1.1 (29%) and *Lb. plantarum* 5.2 (28%). The maximum concentration of CLA isomers reached 0.145 mg/ml. However, the spectrophotometric method could not differentiate between CLA isomers since it is based on measurement of the conjugated double bond in the fattyacid. In conclusion, the present study revealed the capacity of LAB strains isolated from traditional Bulgarian fermented foods to covert free LA to CLA. The applied analytical method proved to behighly time- and labour-efficient for screening a large number of bacterial isolates for the ability to produce conjugated fatty acids.

Keywords: *Bioactive conjugated linoleic acid, Lactic acid bacteria, Bulgarian fermented products.*

THE ROLE OF AGRICULTURAL EXTENSION TO FACE CLIMATE CHANGES IN EGYPT

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Abstract

This study aimed to identify the knowledge of extension agents at extension centers on forms, causes and effects of climate change; and to identify the role of agricultural extension in overcoming climate changes. This study was conducted in all extension centers in El-Gharbia governorate (Egypt), where data were collected from 68 respondents of agricultural extension agents affiliated to 17 extension centers through a personal interview questionnaire made especially for this purpose. Several statistical methods were used to analyze the data (e.g. percentage and frequency tables). The most striking results of the study show that 77.9% of the respondents have a high level of knowledge about the forms of climate change, 76.5% have a high level of knowledge about the causes of climate change and 73.5% of the respondents have a high level of knowledge about the effects of climate change. Almost all respondents (98.5%) have a desire to participate in activities to overcome climate changes. The most of the respondents are aware of the role of agricultural extension in diminishing the causes of climate change and in overcoming the effects of climate change. The effects of climate change on agricultural extension work are as follows: difficulties in implementing the action plan due to change in rain patterns, difficulties in running farms and applying new farming techniques, growing workload put on agricultural extension agents, an increase in costs of training.

Keywords: *Extension service, climate change, Egypt.*

IMPACT OF PRODUCTIVE SAFETY NET PROGRAM ON THE LIVELIHOOD OF RURAL HOUSEHOLDS: THE CASE OF LIBO KEMKEM WOREDA, ETHIOPIA

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Abstract

This study evaluated the impact of productive safety net program on the livelihood of rural households of Libo Kemkemworeda. Towards this end, data were collected from 210 randomly selected households of which 119 were program participants and 91 were non-programme participants selected from four Kebeles of the woreda, where the productive safety net program was implemented. Data were analyzed using descriptive statistics and Propensity Score Matching (PSM model). Results from descriptive statistics revealed that among programme participants and non-programme participants, the total annual income increased averagely by 14467.2 birr and 11469.2 birr. The average livestock holding was 3.7230 TLU and 1.4878 TLU for participant and non-participant households, respectively.Thus, the program enabled them to, through avoidance of forced disposal in response to shock,increase their livestockholdings. Applying a propensity score matching technique, it was found that the program significantly increased participating households total income by 59.1%, livestock asset by 14.09% and consumption expenditure by 22.61%compared to non-participating households. The estimated results also revealed that, households in the program had better access to credit, small land size and better access on agricultural extension, access to aid and less access to irrigation. Finally, physical and biological conservation measures should be widely incorporated, with the access to extension service for the utilization of new technologies and for policy concern. Generally both households increase their livelihood activities respectively interms of livelihood.

Keywords: *Productive safety net, impact, livelihood, propensity score matching, Ethiopia.*

INTERNATIONAL NETWORKING FOR RURAL AREAS SUSTAINABLE DEVELOPMENT: THE CASE STUDY OF WORLD FRIENDSHIP ASSOCIATION OF RURAL AREAS

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Abstract

The number 17, Goal of the SDG 2015-2030 entrusts us with the task of *Strengthen the implementation instruments and revitalize the global partnership for sustainable development.* In the paper the analysis of the role of the international networking to apply the new paradigms for the sustainable progress of all rural areas population around the world has been made. The author believes that it is time to apply, as best practice, some experiences with modern and updating vision concerning the achievement by the Rural Areas, the base to be transformed in this century in Smart Territories and Smart Communities. This paper presents the proposal of the implementation of a World Friendship Association of Rural Areas (W.F.A.R.A.) that is an ongoing foundation with the launching on 22th April 2017 (the Earth Day) and signature of a MoU toward the final approval of the Statute in 2018. The paper shows all motivations, targets, structure and management of the W.F.A.R.A. that will promote and will put in place all the actions at the local, national and international levels in order to make repeatable and transferable models of local development, and process and product innovations that could be repeatable and transferable and in meantime can contribute to the concrete improvement of quality of life in the rural areas around the world toward the Gross National Happiness indicator for its measurement.

Keywords: *rural areas, international networking, smart territories, smart communities.*

SUSTAINABLE TOURISM AND RURAL AREAS DEVELOPMENT: THE CASE STUDY OF MUNICIPALITY OF SACHKHERE IN GEORGIA

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Abstracts

The year 2017 is declared as the International Year of Sustainable Tourism for Development. The authors demonstrate that the Agritourism and Rural Tourism are the main important forms of Sustainable Tourism that can contribute to the innovative and inclusive Local development because they are linked respectively with the agricultural or others activities in the rural areas. Georgia is mainly mountainous country with till current time ahigh relevance of the agriculture and the other production sectors disseminate in the rural areas. The authors present the analysis of the potential of these two forms of Sustainable Tourism in Georgia trough the territorial analysis and presentation of the SWOT. In this framework, they make a concrete case studyat the Municipality of Sachkere in the Western part of the Country. The municipality contains 13 administration units and have 54866 inhabitants, the relief is average and low mountainous, with many natural resources and rich with historical and touristic objects. The culture and tradition of the territory joint with a typical food, drinks and handcraft and textile represent the important elements on which to set up the growth of the Agritourism and Rural Tourism and the creation of a sample model for all the Georgia and the other countries in Caucasus Area.

Keywords: *sustainable tourism, agritourism, rural tourism, local development, Georgia Country.*

GENDER PERSPECTIVES IN WATER, ENERGY AND FOOD SECURITY NEXUS FOR SUSTAINABLE DEVELOPMENT

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Abstract

Developing countries face a difficult challenge in meeting growing demands for food, water and energy in order to provide security in those sectors. Available information evidently indicates that for most of those countries, challenges in securing enough water for energy and enough energy for water will increase with population and economic growth. In addition, the competition for water resources will intensify and climate change will compromise the solutions. In arid and semi-arid countries, those facing serious water scarcity management re of future water needs is a primary nexus issue that will require a gender perspective towards water, food and energy security. For developing countries the nexus should be focusing on the following three action fields: accelerating access, integrating the bottom of the pyramid (the social dimension) creating more with less (the economic dimension), investing to sustain ecosystem services (the ecological dimension). This clearly explains the need for further efforts to be done so far to understand the linkage between the nexus perspective with respect to gender inequalities and to build a diverse movement towards common solutions on the challenging issues of climate change, water, energy and food security. Most of all, it will require new thinking and strategies and that governments, opinion leaders, and civil society will play the central role of food systems and promote new visions and solutions grounded in ecological and social justice principles that relate to gender mainstreaming.

Key words: *gender, water, food, energy, security, nexus*.

FOOD SECURITY SUSTAINABILITY IN THE MEDITERRANEAN: OPTIONS AND CHALANGES

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Abstract

Food security refers to people having physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and preferences for an active healthy life (FAO 2010).Thus food security is addressed invariably with focus on nutritional security, food safety and global environmental change. The problem of food security is exposed to considerable stress due to the number and variety of issues it involves and is now receiving major concern in both developing poor countries and the developed rich ones. The challenges of sustainably increasing the supply of food to meet demand are becoming more difficult in the face of clear environmental limits. Climate change is already and will, increasingly, challenge and perhaps limit our ability to increase food production. Indeed, meeting the many challenges of food security is a complex one involving many different actors and linked disciplines from the local to global level. This complexity is also attributed to the many cross-cutting challenges to food and nutrition security that have a key influence on different aspects of it such as policies, agriculture sector and markets and above all how can we achieve food security in an environment where demand is increasing and natural resources under pressure. Challenges such as food safety, nutritional security, global environmental changes and malnutrition will require, beside an international cooperation, a multidisciplinary approach to tackle the issues associated with them. This can explain why on the globe, for achieving food security, there are no easy answers, and there are difficult tensions and trade-offs need to be confronted head-on. Useful insights to the complexity of food security challenges and some options that could be usefully considered will be provided in this paper.

Keywords*: food security, sustainability,climate change, Mediterranean.*

GOVERNMENT'S INTERVENTIONAL TRAINING IMPACT ON FARMERS COMPETITIVENESS

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Abstract

The agricultural sector, in most cases is supported in developed countries and one of the support measures (government interventions) is training of the sector's actors. The study is carried out to determine the training as a research object for competitiveness theories, analyze the impact of these interventions to farmers' competitiveness and its reflection in indicators that farmers' competitiveness is described with. The study is based on the scientific literature as well as data from year 2008 and 2012 Lithuanian government's interventional farmers training, linked with respondents of Farm Accountancy Data Network. Study shows that trainings as a government intervention affect competitiveness of farmers and how these effects can be measured. Trainings can be a governmental instrument to foster farmers' development.

Keywords: *competitiveness, intervention, training, agriculture.*

RISK ASSESSMENT IN AGRICULTURE: PROBLEMS AND PERSPECTIVES

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Abstract

Agriculture is an economic sector facing large risk, mainly from natural factors and despite of relatively low price responsiveness to supply and demand causes output volatility in general. It is a risky business, and risk assessment and management tools have become increasingly important in recent years. Risk assessment and management is a complex process, since the risk arises from different sources. Due to different risk sources, it is important to consider such factors: seasonality, agricultural products are perishable; variability in prices of raw materials and a long production cycle; climate changes; agriculture is impacted by environmental protection restrictions; fluctuations in agricultural produce demand, supply and prices; high transportation prices lead to an increase in product prices, which entails higher economic risk; climatic conditions; animals and plant welfare, and etc. Typically, scientific literature analyzes only one type of risk. As a result of the research, financial, business, credit, and currency risk models were created and adapted to the various countries conditions (mostly in banking sector). Meanwhile risk in agriculture should be analyzed as holistic phenomenon that is affected by different source of risks (economic, political, financial, human, production). It should be noted, that there is a lack of research related to agricultural activities and their specific features. Risk assessment in agriculture is relevant on both the theoretical and practical level, so it is important to identify main risk factors in agriculture, to investigate their evaluation models/methods, to distinguish their advantages and disadvantages for farmers.

Keywords: *agriculture risk, risk assessment, risk factors.*

AWARENESS ABOUT FOOD SECURITY ISSUES AMONG INTERNALLY DISPLACED PERSONS (IDPs) IN KHYBER PAKHTUNKHWA, PAKISTAN

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Abstract

This study aimed at finding the association of food security (dependent variable) with awareness about food security (independent variables). The study was conducted in ten Bhattai camp (Bricks Factory) at Peshawar, Khyber Pakhtunkhwa, Pakistan. A sample size of 248 respondents was proportionally allocated to each of the ten Bhattai camps. Data was collected through interview schedule covering both the study variables. Chi-square (x^2) statistics was used to test the association of the study variables. The association of food security was found significant with the knowledge about secure food (P=0.035), awareness trainings regarding food security (P=0.050), food security is necessary for every country (P=0.048), government is responsible for the provision of safe food (P=0.017), food security is the basic need of citizens (P=0.021), excessive storage of food can effect food security (P=0.032), improper storage of food can destroy the food stuff (P=0.030), knowledge about checking expiry date on food items (P=0.033), knowledge about the procedure of safe food attainment (P=0.016). Raising awareness through trainings and sessions about food security, food distribution procedure, proper food storage, due process of the food attainment in the camp and its significance in healthy life were some of the recommendations in light of the study.

Keywords: *Food security, displaced persons, Pakistan.*

AZOXIMERI BROMIDUM - PROTECTIVE ACTION OF IMMUNOSTIMULATOR DRUG IN EXPERIMENTAL TRICHINOSIS OF MICE

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Abstract

In our study we evaluated the protective effect of azoximeri bromidum in experimental trichinosis of mice. An assay was carried out on 20 white outbred mice weighting 16-18 g, divided into 2 groups of 10 animals in each. The first group was injected with azoximeri bromidum; the second group was injected with 0.9% NaCl. The drug was injected twice with an interval of 48 hours intramuscularly in a dose of 0.004 mg/mouse. After 48 hours the mice were infected by T.spiralis larvae in a dose of 80±5 larvae/mouse. Analysis of the data indicates that in the experiment the application of this drug had significant protective effect. The number of T. spiralis larvae detected in animals was 142.5±11.1 larvae/mouse, respectively. This was 31.5 times less than in the mice of control group (4485 ± 430.6 larvae/mouse). Based on this, we consider it is expedient to continue the study of this immunostimulator drug in the complex immunoprophylaxis of trichinosis.

Keywords: *immunostimulator drugs, Trihinella spiralis, immunoprophylaxis, immunomodulators.*

ASSESSING THE ENABLING ENVIRONMENT OF THE EXTENSION SYSTEM IN THE KINGDOM OF SAUDI ARABIA

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Abstract

The government of the Kingdom of Saudi Arabia (KSA) is increasingly emphasizing the importance of institutional re-arrangements. One area of current interest to the Ministry of Environment, Water & Agriculture involves reforming the national system of agricultural extension. This research assesses the organizational environment of the KSA national system of agricultural extension. A scale concerning an organizationally enabling environment (seven dimensions with 39 statements) were used for the assessment. The reliability of the scale was estimated by Cronbach's alpha; reliability coefficient was 0.831. Data were collected using a questionnaire form, in personal interviews with 81 extension personnel representing all extension directories in the country during the period May-August 2016. Percentages and mean scores were used for data presentation. The findings revealed that scores for extension personnel's perceptions of the organizational environment scale were above average levels for five components of the scale and below average levels for the remaining two components. The mean score of socio-cultural environment was at the top of the list with the mean score of 5.1 (66.7% of the maximum score), followed by political environment (66.3% of the maximum score) and administrative environment with the mean of about 11.1 (55.5% of the total score). While the mean of extension personnel's perception of the economic environment reached 4.5 (37.5% of the maximum score) followed by legal environment with about 45.8 % of the maximum score. The results also showed that the mean score of the total scale reached 41, which represent 52.56% of the total score of the scale.

Key words: *Organizational environment, Agricultural extension, Saudi Arabia.*

ANTIBIOTIC RESISTANT AND VIRULENCE DETERMINANTS OF ENTEROCOCCI ISOLATED FROM GOAT CHEESE

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Abstract

Dairy products play an important role in all kind of diets around the world, especially in the Mediterranean region. Goat cheese is a typical product of Morocco. The development of indigenous starter cultures consist of strains isolated from fermented foods. These cultures are selected on the basis of their technological characteristics. For traditional products to be widely commercialized, they must be adapted to modern technology and current dietary requirements. Enterococci are ubiquitous organisms used to improve both the flavor and the texture of fermented foods, and provide protective mechanisms as either a probiotic or antimicrobial additive. The aim of our study was to type enterococci from artisanal goat cheese by genotypic methods in terms of antibiotic susceptibility and the presence of virulence determinants. Two hundred fifty *Enterococcus* spp. were invested in this research. They were isolated from goat cheese. The resistance was tested by different disc tests (tetracycline, penicillin, between others). The results of resistance antibiotics indicate that *Enterococcus faecium* possess very low antibiotic resistance in comparison with *E. faecalis*. No vancomycin resistance was observed. The presence of several virulence genes were investigated with PCR. The majority of enterococci isolates showed the presence of one or more virulence factors. *E. faecalis* isolates had multiple virulence traits. On the other hand, *E. faecium* isolates were generally free of virulence determinants.

Key words: *Enterococci, E. faecium, E. faecalis, Antibiotic resistance, Moroccan cheese.*

IMPORTANCE OF RURAL TOURISM AND INVESTIGATION OF ABROAD EXAMPLES

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Abstract

Urbanization, one of the biggest problems in 21st century, causes many environment problems such as structure areas and population increase. The decline of urban green spaces and environmental problems in cities have made rural life and rural values again important in recent years. In this context, the concept of rural tourism, which emerges as a kind of alternative tourism in line with the changing income levels, needs and wants of the people covering the whole of the tourism activities in the rural areas, is getting more and more important day by day. Rural tourism, which enables rural areas to develop socio-culturally and economically, also offers tourists the chance to get in touch with natural beauties and meet local cultural characteristics. Turkey has a high potential for rural tourism, which plays an important role in preserving natural and cultural heritage as well as providing local sustainable development. In order for this potential to have a significant share in the development of Turkey, the right perception and development of the concept of rural tourism must be planned correctly. With this study, the importance of rural tourism will be emphasized and suggestions will be developed for our country by giving examples of rural tourism from Australia, South America and European countries.

Keywords: *Rural tourism, Rural development, Sustainable development, Turkey.*

DEVELOPMENT OF THE PROTOTYPE APPLICATION OF A WIRELESS SENSOR NETWORK AND INTERNET OF THINGS FOR GREENHOUSES

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Abstract

Nowadays, new technological developments in smart farming have contributed to horticulture, greenhouse, and livestock production. Wireless Sensor Networks (WSN) and Internet of Things (IoT) technologies can be used in data-driven intelligent agriculture applications. With more efficient use of energy, water and fertilizers, the increase in productivity and efficient management of all processes from production until storage can be provided by using WSN and IoT technologies. The correct irrigation, fertilization and pesticide spraying applications will contribute to low cost production and the protection of the environment, as well as making things easier of farmers. The local agro-meteorological and field data based on sensors are important. These data can be used to evaluate meaningful outcomes for risk estimation, agricultural insurance, financial support and compensation mechanism. In this study, a cheap prototype system for greenhouses was developed by using WSN and IoT technologies. The system consists of four wireless sensor nodes: one master node and three slave nodes. A Raspberry Pi-2 board was used as the master computer. A DS18B20 temperature sensor was used for each node. Raspbian Linux OS run the master computer to make works including temperature measurement, wireless linking with slave nodes, and recording data coming from slave nodes. As slave nodes, a Raspberry Pi-2 board, a NodeMCU module and an ESP8266 WiFi module were used. The air, substrate, leaf and water temperatures for soilless crop cultivation applied in greenhouses were measured in real time. Data coming from slave nodes were recorded on the SD card of the master node.

Keywords: *Smart farming, Greenhouse, Internet of things, Wireless sensor network.*

INOVATIVE MOBILE DRYING LINES FOR REDUCTION OF POSTHARVEST GRAIN AFLATOXIN CONTAMINATION

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Abstract

Great economic losses,subsequent health issues,occurs in Pakistan,surrounding countries due to aflatoxin postharvest contamination of food/maize/cereals.In this regard,we have developed mobile-drying lines (drying tunnels trolley, type units) at site (in house) use in the reduction of potential postharvest-aflatoxin contamination with cost of 0.70 $/bag at farming/loss areas for food-safety. By use of this mobile technology grain moisture is reduced up-to 14%,thus minimized loss ratio,involvement of multiple-technologies, including treshing, sorting, spreading, drying to avoid multiplication, enable us to kill portability at all stages for food-security,zero food-loss.Multiple value-added drying lines has reduced pre/post harvest-losses permanently,our funded/economic survival sustained us in productivity for economic-stability so we dominated losses.The drying process in food/maize/grits value-added grain are being also irradiated as IAEA/FAO appointed as sole technological-stakeholders in Pakistan since 1990. Economic losses are 30-40% during peak-season in cold-days,this loss is being minimized by our mobile-drying services, High-moisture content instantly removed at safe limits for food security,applied multiple-technologies (mobile-drying,sun-drying,trolly-drying,sheet-drying,roof-drying,open area drying),then move to grinding,gritting,powdering,crushing etc. In Mobile drying, we apply drying temperature of 60-70°C approx for 2-3 hours later on temperature is 50-55°C for 2-3 hours which reduced portability and longer food‘s shelf life. In early 1975 we approached EU/USA dryer-manufactures such as SIMON-DRYERS ,prices were high.We hired technical NL dryer-consultants, local drying-lines were developed at 20times less cost. All SDGs has been industrialized for food-security.Our 40years of innovated industrial-based FOOD-SECURITY TECH is ready to save FOOD-SAFETY by 2017-18,instead of 2050.

Keywords: Zero *Food Waste, Food Sustainablity, Reduction in Aflatoxin production, reduction in grain nutritional loss, Food Shelflife.*

THE NEED FOR INNOVATION POLICY SUPPORT IN POLISH AGRI-FOOD SECTOR

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Abstract

The research objective of this paper is preliminary justification of the need to support the transfer of innovations to the food-processing sector. Another objective of the study is also to determine changes in the last period in policies to improve innovativeness and induced by them changes in legislation related to the system of innovation transfer. The basis for the research was studied literature, especially in the field of main stream economics, New Institutional Economics, public choice theory. The empirical material for analysis was the statistical data of the Central Statistical Office (CSO) for the years 2010-2015 and Agency for Restructuring and Modernization of Agriculture (ARMA). The findings show that in the case of food processing sector the efficient policy support in innovation transfer seems to be needful. Conducted research also shows that it is very urgent issue.

Keywords: *Inovations, food-processing sector, Poland***.**

THE POTENTIAL OF ECOTOURISM: A CASE STUDY OF DOGANYURT

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Abstract

The existence or development of tourism is dependent mainly on cultural, historical and natural attractions. Ecotourism, in the context of valuing natural and cultural resources, is the most important subcomponent of sustainable tourism. It is an increasing trend that people seeking to engage in tourist or recreational activities prefer to do so in natural areas. Recently, Doganyurt has a wealth of natural, cultural, historical and recreational values, and its location near the Black Sea offers the significant potential for tourism in the area. This study, which examines the important natural and cultural values of the neighbourhoods around Doganyurt, describes the improved tourism and recreational activities available in the area, which are expressed using geographical information systems. Evaluation of the area and the tourism potential of the immediate environment have been undertaken in order to provide suggestions. The findings of this research are that Doganyurt has rich potential for ecotourism practices and that various possible types of ecotourism activities are applicable to Doganyurt. In addition, this study proposes identifying the targets of multidisciplinary work with ecotourism principles based on the production of the projects and their proper implementation.

Keywords: *Doganyurt, Ecotourism, ArcGIS.*

POOR RURAL COCOA PRODUCERS IN CAMEROON

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Abstract

Cocoa remains the main cash crop to more than 75% of the population of Cameroon. It is produced mainly by peasant farmers who even though they are the main producers of the highly demanded crop, do not earn sufficient income to meet their needs and maintain a moderate standard of living. This study aims at determining the economic status of Cameroon's rural people. Field visits were carried out in 10 villages in MEME Division with at least 5 experts spending at least one week in these villages. This was to assess the average quantity of cocoa that a farmer in the rural area produces; how they manage their cocoa farms; how they manage their income and if they keep records. Results show that an average farmer in the rural area produces 32.3 bags of cocoa yearly but they lack knowledge on how to manage their income since there are no banks in the villages. Only 11.2% save their monies in banks in the cities, 25.4% save theirs in "njangi" houses while the remaining 64.4% do not save at all. These make them to mishandle their income and they are forced to borrow chemicals for the next planting season causing the buyers to be the one to determine the price of the cocoa they produce. 84.1% borrows chemicals from their buyers, 15.3% keeps detailed records while 84.7% does not and this makes them unaware of if they are losing or gaining. In order to change their economic status, they have to be encouraged to create and/or join farmers groups that would enable them to better market their produce, educate them on the importance of saving, better agricultural practices, and how to keep good records.

Keywords: *Cocoa producer, Rural, Cameroon, Poor, Field survey.*

ECONOMIC ANALYSIS OF PEAR ORCHARD ESTABLISHMENT

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Abstract

As a fruit crop, the pear is preferably grown and esteemed for its high utility value. Over recent decades, there have been great fluctuations in both quantity and quality of the pear fruit for a variety of reasons (obsolete growing technology, cultivar diversity, increased fire blight attacks, market instability, etc.). Given the favourable environmental conditions in Serbia and pear fruit shortage on domestic and foreign markets, producers' interest in pear production has increased over the last several years. Pear orchard establishment requires a previous comprehensive analysis of agroeconomic conditions which determine both the choice of cultivars and the size of an orchard. Therefore, the objective of this study was to analyse pear orchard establishment costs. Two cultivars were used i.e. 'Vilijamovka' and 'Santa Maria'. The results of the agroeconomic analysis showed that the investment costs of establishing 1 ha orchard amounted to €11,660. Orchard management costs were €2,020 in the first year, €1,803 in the second year and €3,026 in the third year. Substantial economic profits and returns on investment can be expected at full productivity.

Keywords: *Pear, Economic analysis, Costs, Profit.*

THE ROLE OF AGRICULTURAL SERVICE IN PRODUCTION OF HEALTH PLANTING MATERIAL IN RASINA DISTRICT, SERBIA

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Abstract

Rasina district has tradition in production of planting material for the production of nursery plants of fruits and grapevines in the Republic of Serbia. Production of certified planting material is a complex and demanding job that requires good organization, the necessary legislation, trained people, properly equipped competent institutions, a good knowledge of the epidemiology of pathogens and constantly adopting new scientific knowledge, strict implementation of scientific know-how in production process, in order to guarantee the varietalaccuracy, defined health status and quality of planting material.According to the current international and national legislation, propagation material can be placed on the market only if it is produced in registered nurseries underofficial control of phytosanitary service if officially confirmed that they belong to one of the categories listed in the scheme of regulation and certification. Agricultural Service Krusevac, as competent institution for phytosanitary control with professional capacities for the implementation of health control has decades of experience in the control of pathogens of fruit trees and vines in parent plantations and seedling.Phytosanitary control hasparticular socio-economic importance for farmersproviding them with guaranteed quality, safe product placement and incomeon the domestic and international markets. The production of healthy planting material is also important for farmers, because it allows the fulfillment of international obligations and raisingof reputation of the country, compliance with international conventions, and enabling farmers realization of safe financial income of the export of planting material, as well as large quantities of high-quality fruit and grapes and their products.

Keywords: *Nursery plants, healthy planting material, Rasina district, Serbia.*

ROLE OF GEOGRAPHICAL INCANTATORS IN THE VALORIZATION OF LOCAL PRODUCTS: CASE OF DEGLET NOUR TOLGA (ALGERIA)

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Abstract

One of the characteristics of terroir products is quality. A product of quality terroir must possess particular characteristics that differentiate it from the others. These characteristics are typical of this product: organoleptic, physicochemical or morphological. Through this communication, we will try to demonstrate the characteristics of DegletNour of Tolga obtained from different regions, from a morphological and physico-chemical point of view, by analyses at the laboratory level. The results confirm that the date of DegletNour of the Tolga region has specific characteristics compared to the DN dates of OuedRigh and Tunisia. Also the DegletNour de Tolga presents a specific quality linked to the geographical origin that distinguishes this product from the other DegletNour. This confirms that Tolga's DN date quality is the result of the combination of natural factors and human factors that give originality to this product.

Keywords: *Product of terroir, DegletNour, Tolga, valorization, Geographical indicators.*

ECONOMIC ANALYSIS OF THE IMPACT OF FEEDING FACTORS IN MILK PRODUCED FROM HOLSTEIN DAIRY COWS IN KOSOVO

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Abstract

With the aim to evaluate economic impact of feeding factors in milk production, one year study was done (January – December 2015) involving 12 Holstein dairy farms (284 cows) in Kosovo. During the study period the structure of the diet and the amount of feed and the amount of milk produced were measured monthly based. The cost of in-farm produced feed, or the prices of purchased feed and the price of milk were used to do the calculations. Results showed that 74% of the feed is produced in the farm and includes roughages while all concentrates (either ingredients or mixtures) are purchased. Economic analysis showed that prices of feed produced within a farm were lower (30 €/ton for silages and 30 €/ton for hay) compared with feeds bought from local markets (80€/ton for hay and 280€/ton for concentrate mixture). Average cost of the ration was 2.33 €/cow/day, while average milk income was only 4.9 €/d. Total average sold milk price with all subsidies given by the state was 0.34 €/kg. Average production cost for milk was 0.29 €/kg with net profit of 0.05 €/kg of milk. Individual feed groups contributed as follows: silages with 0.04 €/kg, dry roughages with 0.02 €/kg, and concentrates with 0.10 €/kg, while all other factors make 0.13 €/kg of milk price. About 62.5 % of milk produced within these farms was categorized in Extra Class, farmers were additionally rewarded by the state with 0.06 €/kg. The main finding of this study is that feed makes the largest expense in all analysed farms and in average makes 55% of the milk production cost or 68% of all farm costs.

Key words: *milk cost, feed cost, farm income.*

7. FORESTRY AND AGRO-FORESTRY

IMPACT OF DROUGHT AND SITE CHARACTERISTICS ON VITALITY AND RADIAL GROWTH OF *CEDRUS ATLANTICA* MANETTI IN THENIET EL HAD NATIONAL PARK (ALGERIA)

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Abstract

This work aims to study the impact of drought and site characteristics on vitality and radial growth of Atlas cedar (*Cedrus atlantica* Manetti) in Theniet El Had cedar forests (North-West of Algeria). The approach used is based on the techniques of dendrochronology. The climatic signal recorded in ring-width series of Atlas cedar trees was investigated by bootstrapped response function and pointer year analysis over the period 1930-2010. The results show a good agreement found between the individual curves and those of mean site chronologies, which reflects the major action of climatic factors on trees radial growth. Indeed, cedar is very sensitive to rainfall fluctuations throughout the year. The relationships tree rings-climate shows that precipitation from October$_{t-1}$ to April$_t$ psitively affect ring-width. A positive relationship also involves August and September. In contrast, negative relationships are shown between May to June precipitation and ring-width. This sensitivity is more pronounced for populations located at low altitude, on abrupt slope and on sandstone or marl substrates. Temperature, meanwhile, does not seem to play a decisive role in Atlas cedar radial growth. Its role is positive in winter but negative in summer. Pointer year analysis showed that dry years induced a significant radial growth decline and could trigger massive tree mortality, particularly in 1983, 1984, 1988, 1994 and 2002. The vitality of Atlas cedar seems to be conditioned by the frequency of drought years.

Keywords: *Cedrus atlantica, tree-ring width, environmental conditions, drought, Algeria.*

DEVELOPMENT OF THE SYSTEM FOR FOREST GENETIC MONITORING IN THE BALKANS

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Abstract

Genetic diversity is the basic level of biodiversity, which at higher levels includes species, ecosystem and landscape diversity. This hidden biodiversity has not been included till now into the systems of monitoring in forests, although it is included in most national forest programmes in European countries, which are supporting sustainable management which in turn is based on conservation of biodiversity starting from the genetic level. The fast changing climates, forest management and measures applied in breeding all influence the evolutionary potential of populations of forest trees. This results in changes in genetic variability and impacts the potential for adaptation of forests to the future environments. Forest genetic monitoring is an early warning system to aid the assessment of a species response to environmental change at a long-term temporal scale. It is based on development of the optimal indicators and verifiers pointing to any changes in genetic variability in time through creation of research plots in natural forests, starting with beech (*Fagus sylvatica*) and firs (*Abies alba* / *A.borisii-regis*complex). Further it aims at preparation of guidelines for establishment of forest genetic monitoring system, a Manual and a Decision support tool, and at preparation of professional expert documents for relevant policy makers at the national, regional, and European level. Since forest genetic resources cross over national borders, development of the forest genetic monitoring system should be realized in all countries on the transect line from Germany to Greece, including surrounding countries, for at least the seven elected forest tree species.

Keywords: *Lifegenmon, monitoring, genetic diversity, climate changes, sustainable management.*

ANALYSIS OF DIFFERENCES OF GROWTH AND PHENOLOGY PROVENANCES OF SCOTS PINE (PINUS SYLVESTRIS L.) BY EXPERIMENT PROVENANCES IN ŽEPČE MUNICIPALITY AREA (BOSNIA AND HERZEGOVINA)

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Abstract

This paper analyses the growth and phenology of fourteen (14) European provenances of Scots pine at the international experimental plot in Zepče municipality area (Bosnia and Herzegovina). The experiment with the provenances was developed during the spring of 2012 with two (2+0) year old plants. In total, 1400 Scots pine saplings were planted in an experimental random block layout, fourteen (14) provenances in four (4) repetitions (4 x 25 plants). The experiment was composed of provenances from ten (10) European countries: Austria (Traisen, Rein, Sistrans), Bosnia and Herzegovina (Bugojno), Scotland (Shieldaig), Ukraine (Ivano Frankivsk), Slovakia (Hanusovce), Romania (Sacueini), Norway (Narvik), Germany (Trippstadt), Poland (Raciane – Nida) and Italy (Ca del Lupo, Fenestrelle, Piani – Valda). The morphological results were related to the differences in survival, heights, diameter on the root neck and the ratio of these measurements to the height of the saplings of different provenances of Scots pine. Phenological details were related to the phenology of the buds and complete formation of pine needles. All of the details researched yielded notably different findings. The results of the research can play a significant role in reforestation as well as the preservation of the genetic wealth of Scots pine.

Keywords: *Scots pine (Pinus sylvestris* L.*), provenance, circumference at the neck of the root, height, phenology.*

ANTIOXIDATIVE AND ANTIMICROBIAL ACTIVITY OF METHANOL EXTRACTS OF THE DALMATIAN LABURNUM (*PETTERIA RAMENTACEA*)

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Abstract

The aim of this study was to determinate antioxidant and antimicrobial activity of methanol extracts from different parts (root, stem, bark, leaf, inflorescence and seed) of *Petteria ramentacea* (Sieber) C. Presl). The antioxidant activity of the plant extracts was determined by 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity. The antimicrobial activity of the extracts was tested against standard strains of gram positive (*Bacillus subtilis* subsp. *spizizenii*, *Staphylococcus aureus* subsp. *aureus* and *Staphylococcus epidermididis*) and gram negative bacteria (*Escherichia coli*, *Pseudomonas aeruginosa* and *Salmonella abony*). The antifungal activity of the extracts was tested against standard strains of fungi *Aspergillus brasiliensis* and *Candida albicans*. The seed and leaf methanol extracts showed very high antioxidant activity while other extracts had equable and moderate activities. The methanol extracts showed moderate both antifungal and antibacterial activities against the test microorganisms, except for *S. epidermididis.* Due to the estimated antioxidant activity, the reported antimicrobial activities in this study, previously determined concentrations of certain phenolic compounds in the same methanol extracts, and lack of correlation between them, as well as data in literature on the chemical composition of the Dalmatian laburnum, we can assume that antioxidant and antimicrobial activities of the analyzed extracts are, probably, a result of presence and activity of some quinolizidine alkaloids. Since the methanol extracts of *P. ramentacea* are potential natural antioxidant and antimicrobial preparations against the analyzed bacteria and fungi, it is necessary to analyze and compare *P. ramentacea* extracts in different solvents in order to isolate and identify their chemical constituents and potential bioactive compounds.

Key words: *antibacterial activity, antifungal activity, Balkans, endemic, phenolic compounds.*

PHYTOCHEMICAL SCREENING AND ANTIMICROBIAL ACTIVITY OF EUROPEAN HOP-HORNBEAM'S (OSTRYA CARPINIFOLIA) AERIAL PARTS

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Abstract

Ostrya carpinifolia Scop. (European Hop-Hornbeam, Betulaceae), a small to medium sized deciduous tree native to Europe and south-west Asia, is an important species of pioneer communities suitable for afforestation and landscape architecture. Aside from ecological and economical valuables in forestry, and according to published phytochemical investigations of some *Ostrya* species, *O. carpinifolia* could also be a source of bioactive chemical substances, known as secondary metabolites, with beneficial effects in broad arrays. In order to determine the presence of certain phytocomponents, aqueous extracts of *O. carpinifolia* leaves, stem and inflorescences (obtained near Sarajevo, Bosnia and Herzegovina) were screened qualitatively for 12 phytochemical constituents using fast screening standard methods. Antimicrobial activity of methanol extracts was investigated using the disc diffusion method against the selected test microorganisms: *Bacillus subtilis* subsp. *spizizenii*, *Bacillus vulgatus*, *Enterococcus faecalis*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Salmonella abony*, *Staphylococcus aureus* subsp. *aureus*, *Staphylococcus epidermididis*, and *Candida albicans*. All three analyzed aqueous extracts were found to contain tannins, coumarins, emodins, terpenes, terpenoids, steroids, cardiac glucosides and flavonoids. Leucoanthocyanins were observed in the stem extract but not in the leaves and inflorescence extracts. Anthocyanins, fatty acids and saponins were absent in all studied extracts. All methanol extracts showed no antibacterial and antifungal activities against the test organisms. To our knowledge, this is the first report of phytochemical screening and antimicrobial activity of *Ostrya carpinifolia*, which represents a good basis for further research.

Key words: *antibacterial activity, antifungal activity, Betulaceae, qualitative phytochemical analyses, secondary metabolites.*

ADAPTIVE GENETIC VARIABILITY OF EUROPEAN BEECH (*FAGUS SYLVATICA* L.) IN A PROVENANCE TRIAL "MEDVEDNICA"

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Abstract

International beech provenance trial "Medvednica" was established during spring 2007 on homonymous mountain near Zagreb, Croatia. Trial involve 21 provenance from 9 European countries which are arranged in a randomized complete block design with each provenance represented by 50 plants in three replications (blocks), planted in rectangular plots with 2.0 × 1.0 m spacing. The aim of this study was to determine the amount and pattern of adaptive genetic variability among populations for height growth, survival and flushing phenology. The data were obtained in 2009 and 2016 for flushing phenology and in 2010 and 2015 for height growth. Analyses of variance (ANOVA) were performed using the MIXED procedure in SAS software to determinate differentiation among provenances in flushing phenology and height. Multivariate regression tree (MRT) analysis was used to determine the pattern of genetic differentiation. Results of this study suggest genetic differences among provenances, driven by natural selection in original sites. Better insight about adaptability of the provenances in a given environmental conditions will be provided with further research in this provenance trial. Researches like this are important for identification of provenances which are characterized by good growth and adaptability, in order to use it as a seed source for future reforestations.

Keywords: *Fagus sylvatica, adaptation, tree height, flushing phenology, survival.*

Acknowledgement

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IMPACT OF THE SPECIES COMPOSITION OF A STAND AND DEGREE OF DECOMPOSITION ON THE WATER ABSORBABILITY OF ORGANIC MATTER IN FOREST SOILS

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Abstract

Organic horizons of forest soils are characterized by double capillarity: between molecules and inside them. The filling of internal capillarity may depend on the origin of the organic debris. The object of the study is organic matter, which constitutes a part of the organic horizons formed in selected beech (*Fagus sylvatica* L.) and fir (*Abies alba* Mill.) stands of the Beskid Makowski Mts in southern Poland. The aim of the study was to determine the average time of water absorption by particles of beech and fir organic matter and to compare it with the average time of water absorption by spruce organic matter (*Picea abies* (L.) H. Karst), as determined by Kucza (2007). The measurement of absorbability consisted in measuring the time of soaking of organic particles from the moment of immersion of an air-dry sample in water until its sinking to the bottom of the beaker, i.e. until the particles soaked in water exceeded the density of 1.0 $g \cdot cm^{-3}$. Apart from the average absorption time, we determined the share of sinkable and non-sinkable organic matter as well as the degree of organic matter decomposition. As a result of the research, it was found that the longest time of absorption of the organic particles of the litter horizon characterized fir stands, whereas the shortest time applied to beech stands. In turn, the fermentation and humification horizons of spruce stands were characterized by the shortest water absorption time as compared to the detritus horizons of the remaining species. It was found that the time of water absorption by fir and spruce organic matter decreases with the advancement of decomposition processes. A reverse dependence was noted for beech stands, where progressive decomposition processes cause a significant increase in the time of water absorption by organic particles.

Keywords: *Forest hydrology, Forest soils, Organic matter, Water absorbability, Poland.*

DISTRIBUTION OF THE SATURATION DEGREE IN SELECTED PROFILES OF MOUNTAIN FOREST SOILS

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Abstract

The primary source of soil water in the mountains is provided by precipitation. Water soaks into the soil and then infiltrates deep into the profile beyond the reach of plant roots or is maintained by capillary forces in the rhizosphere. In mountain soils, which have a large share of rock fragments as well as good permeability, the water in the aeration zone is the primary source of water available to plants. Water present in soil conditions and the development of vegetation, affects soil processes and plant nutrition. Soil is a reservoir of water, which is drained through the ground to watercourses. The possibility to accumulate water in the soil during precipitation and its gradual release through underground runoff during drought periods is crucial for forest flood protection. The aim of the study was to determine the degree of saturation along the depth of 14 profiles of mountain forest soils and to distinguish the factors determining that distribution. The research was located in an area of 1.6 km^2 of a forested mountain catchment in the Beskid Śląski Mts in southern Poland. The degree of saturation was measured down to a depth of 120 cm using the geoelectrical method with the application of porous blocks constructed by the authors. In individual layers of the studied soil profiles, the authors determined bulk density, total porosity, organic matter content and the share of rock fragments. Research results revealed differences in the distribution of the degree of saturation among the different soil profiles under examination. The highest values of the degree of saturation were usually found in the middle and bottom part of the soil profile. The amplitudes of the values measured varied both along the depth of a profile and between profiles.

Keywords: *forest hydrology, mountain forest soils, water supply, degree of husaturation, Poland.*

SPATIAL PATTERN AND STRUCTURE OF OLD-GROWTH FOREST STANDS IN NORTHERN POLAND

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Abstract

The aim of the research was to analyze the spatial pattern and structure of old-growth forest stands dominated by Scots pine (*Pinus sylvestris* L.), located in the area of Research Station of Polish Academy of Sciences in Popielno. The research was conducted on seven sample plots - three in coniferous forests and four in deciduous forests. Using Ripley's function, the spatial pattern of all trees and Scots pine, oak (*Quercus robur* L.), lime (*Tilia cordata* Mill.) and hornbeam (*Carpinus betulus* L.) trees was analyzed. On most plots, all trees were arranged randomly. Cluster distribution of trees was found only in two cases – one in coniferous and one in deciduous forest. In the case of Scots pine, on three plots random pattern was observed, on two plots cluster, and also on two plots – regular distribution of trees. Diameter structure, height structure and the social structure of forest stands were also analyzed. Hornbeam and lime trees were in progression. In the case of Scots pine, the beginning of regression process in deciduous forests was observed. In the coniferous forests, Scots pine was the dominant species and progression of the spruce was observed (*Picea abies* L.).

Keywords*: Spatial pattern, Ripley's K function, Coniferous forest, Deciduous forest.*

PAULOWNIA SPP. AND TRUFFLES (*TUBER* SPP.) PLANTATIONS IN ROMANIA

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Abstract

The agroforestry systems that use this type of plantations have important social and ecological value and represent a direct contribution to rural economies. From this point of view, the plantations with *Paulownia* spp. or another one trees for truffle productions represent a good opportunity for some countries that present a surplus of surfaces that are not covered with agricultural or forest cultures as is the case of Romania. This article's main objective was to analyses the evolution of *Paulownia* plantations and of seedlings inoculated with truffles from Romania during the last years. In order to achieve this objective, 6 *Paulownia* plantations and 2 truffle plantations were studied. The investigations carried out prove the fact that the realization of cultures for wood (*Paulownia* spp.) or for the production of truffles can be achieved in good conditions only if the ecological requests of the plants and the site conditions of future cultures are taken into consideration. Unfavorable results were obtained for the *Paulownia* plantations due to frosts from higher altitudes (where the culture of this species is not recommended for the future) or due to some technical mistakes (cutting too strongly the roots, not removing the weeds). However, the two types of cultures are recommended for usage in the future (only in proper site conditions) as they bring numerous advantages to field owners (primarily financial, but also ecological).

Keywords: *Agroforestry, afforestation, Paulownia spp., truffles.*

THE EFFECT OF DROUGHT AND HERBIVORY ATTACK ON PHYSIOLOGICAL PARAMETERS OF PENDUCULATE OAK (*Quercus robur* L.)

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Abstract

Penduculate oak (Quercus robur L.) is one of the economically and ecologically most important tree species in lowland forests of Southeastern Europe which survival is severely endangered by environmental changes with water availability and pests attack being most important factors. In this study we investigated the effect of drought and herbivory attack of gipsy moth (*Lymantria dispar*) on young oak seedlings. Two families of oak seedlings previously germinated in growing chamber we treated with following treatments: drought (D); gipsy moth (GM); both drought and gipsy moth (GM+D) and control (Ø) for the period of 15 days following recovery period of 7 days. During both treatment and recovery, physiological parameters: net photosynthesis (A), transpiration (E), stomatal conductance (gs), sub-stomatal CO_2 concentration (ci) water use efficiency (*WUE*), nitrate reductase activity (*NRA*) and chlorophyll content were measured. Results of net photosynthesis (*A*) showed decrease regardless the date of measurement in the range 61-81% compared to control plants. Transpiration rate (*E*) and stomatal conductance (*gs*) were both affected by the treatment and dependent upon the origin of plants. Recovery period did not significantly affect *A* and *gs*, while *E* and *WUE* showed effect of recovery on investigated plants. *NRA* was more negatively affected by treatments, when compared between families, *NRA* was lowered by 79.5% in first and by 22.2% in second family with water deficit. Similar to the *NRA* results, decrease of chlorophyll content was more pronounced in first family, while only drought treatment decreased chlorophyll content in second family. Obtained results showed significant effect of stress factors on physiological processes in oak seedlings which can result in decrease of the efficiency of forest regeneration. Also, the differences in reaction between investigated families, what indicates the need for breeding and selection of more resistant progenies and provenances of penduculate oak.

Keywords: *penduculate oak, gipsy moth, photosynthesis, transpiration, nitrate reductase activity.*

VARIABILITY OF THE NATIVE BLACK POPLAR FROM THE DELIBLATO SANDS BASED ON MORPHOLOGICAL, ANATOMICAL AND MOLECULAR MARKERS ANALYSES

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Abstract

The native black poplar (*Populus nigra* L.) is one of the most important tree species of alluvial mixed forests in Europe. It is also an indicator species for vitality and intactness of native riparian ecosystems. Due to a serious loss of its natural habitat and lack of natural regeneration over the last century, the black poplar is considered on the verge of extinction. The research was conducted within black poplar natural population located in the Deliblato Sands Nature Reserve, in northern Serbia. The Deliblato Sands is one of the last and the largest oasis of the sand, steppe, forest and wetland vegetation in the Pannonian Plain, covering about 300 km^2. The research involved the examination of diversity of the native black poplar population based on various phenotypic traits (leaf morphology and anatomy) and molecular markers (12 nSSR loci). The gene pool of the remaining black poplars on this territory is still well preserved; even though it is considerable fragmented today, the variability exists on all levels of research. Result showed that there were no duplicates within selected individuals. Most of the remained black poplar fragments are located near the Danube valley but there is still some trees remained in the heart of the Deliblato Sands, the area that was most probably the basin of the Danube River long time ago. The obtained results should be used for further development of dynamic conservation strategies of the black poplar in this wide forest stands, to save the evolutionary created adaptation potential of this valuable species.

Key words: *Black poplar, diversity, genetic markers, Deliblato sands.*

DIVERSITY OF ECTOMYCORRHIZAL TYPES ON NORWAY SPRUCE IN SERBIA

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Abstract

Norway spruce (*Picea abies* L.) is a significant host for rich community of ectomycorrhizal fungi which is an important part of below ground biodiversity with influence on functioning of forest ecosystems. We analysed ectomycorrhiza community in Norway spruce stands in National Parks Kopaonik and Tara and in Natural Park Stara planina in Serbia and the potential effects of growing season on the ectomycorrhiza diversity. Identification of fungal partner from ectomycorrhizal types was done using a standardised sampling in a combination with anatomical and molecular identification of fungal partners based on PCR amplification and sequencing of the ITS regions within nuclear ribosomal DNA. Thirty one different types of ectomycorrhiza were recorded from which 11 types were determined to species level, 11 to genus, one to family level and 8 ectomycorrhizal types remained unknown. At studied sites Stara planina, Kopaonik and Tara 10, 14 and 11 ectomycorrhizal types were observed, respectively. A number of ectomycorrhizal types and diversity indices did not differ significantly within investigated spruce sites and between seasons. The most abundant ectomycorrhizal types in ectomycorrhizal communities of spruce stands from studied sites were: *Laccaria laccata, Russula firmula, R. olivacea, Tylospora fibrillosa, Tomentella badia, Tomentella* cf. *sublilacina, Entoloma* sp., *Cenococcum* sp., while other ectomycorrhizal types made only few percentage of the whole ectomycorrhizal community. Genera *Russula* and *Clavulina* were the most abundant with 4 and 3 ectomycorrhizal types respectively, while genera *Lactarius, Tomentella*, *Inocybe*, *Sebacina* and *Cortinarius* had two distinct ectomycorrhizal types. None of identified ectomycorrhiza belonged to any of commercial edible fungal species.

Keywords: *Ectomycorrhiza, Picea abies L., fungi, identification, sequencing.*

TYPOLOGICAL BASIS OF FOREST IN PLANNED REGIONALIZATION OF FOREST COMPLEXES AND FUNCTIONAL VITALITY AND DURABILITY

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Abstract

Forest, as the most perfect form of natural-historical treatment, represents the most important natural basis of life. Today, value of forest ecosystems is connected with and does include not only quantity and quality of wood volume but also the value of forest as the most important entity for production of oxygen, protection of soil erosion, spring existence, microclimate effects, health effect and others. Multiple positive effects and multifunctional exploitation of forest are accomplished not only by itself, but also it is necessary, using planned concepts, to create basis which will provide multifunctional and permanent exploitation of forest (functional durability). That kind of concept demands and it is only obtainable if it is used a different approach in the very beginning. That implies creating of true basis that is based on a studying and characterization (classification) of forest as a complex biogeocoenosis i.e. considering nature and methodological procedure, typological study and typological classification of forest complexes and defining typological affiliation of a particular part of forest. Primary ecological-coenosis and dynamic structure, that is initial in assessment of the situation according to potential and possibilities in specifically defined purpose, is provided through the typological definition. These elements are basic starting point in assessment and estimation of specific forest part value in the aspect of providing functionally-optimal state in purposed planning and multifunctional forest value in general.

Key words: *type of forest, typological basis, purpose, purposed forest regionalization.*

FIRST RECORD OF THE PARASITOID (HYMENOPTERA: EULOPHIDAE) AS NATURAL ENEMY OF HONEY LOCUST SEED BEETLE *MEGABRUCHIDIUS TONKINEUS* (Pic, 1904)

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Abstract

The genus and species of this parasitoid (Hymenoptera: Eulophidae) of established wasp still have not been determinate but it has been concluded that is presumably the indigenous polyphagous ectoparasitoid of seed beetle imago specimens. Insect have been recognized with **exuvia**, dead adult seed beetle with emerge hole on abdomen and preserved adult specimens. *Megabruchidius tonkineus* (Coleoptera: Chrysomelidae: Bruchinae) as new species are established in Republic of Serbia during intensive studies from 2012 to 2017. These seed-beetles develop in pods of woody legume the honey locust, *Gleditsia triacanthos* and the Kentucky coffee tree, *Gymnocladus dioicus*, widely grown ornamental trees in Serbia. Materials were collected from the many localities inhabited by those host plants in Republic of Serbia, both woody introduced legumes, resulting with detection of seed predation confirmation. About 300 seeds per locality were investigated in detail, representing local populations of host plants and seed beetles' interspecies relation. Several recent reports reveal that this species are well established in France, Hungary, and Bulgaria. Species of Bruchinae, closely related to *Megabruchidius* usually are hosts to many experimentally reared specimens of parasitoids (Hymenoptera: Braconidae; Pteromalidae; Eulophidae; Eupelmidae, Braconidae.) and the presence of hyperparasitism is also detected, during mentioned our experimental work. Until now, this is the first recognized parasitoid wasp on *Megabruchidius tonkineus*, in the region, even anything similar does not exist in the literature generally.

Key words: *Parasitoid, Megabruchidius tonkineus, Eulophidae, Serbia, Seed beetle.*

SOIL POTENTIAL FOR POPLAR PLANTATIONS ESTABLISHMENT IN THE AREA OF PE „ŠUME REPUBLIKE SRPSKE“ (BOSNIA AND HERZEGOVINA)

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Abstract

The paper presents the characteristics of soil in the area of the right bank of the Sava River. The research was conducted in areas managed by Public Enterprise „Šume Republike Srpske“, forest economy „Gradiška“ (Republika Srpska, Bosnia and Herzegovina). In this area, two soil profiles were opened in central zone of bottomland. Studied soil is moistened by flood waters and ground waters which movement depends on the water level of the Sava River. In this area soil belongs to hydromorphic order, type of soil is alluvial semigley, and the morphology composition is: Aa-IGso-IIGso. These soils are neutral to slightly alkaline. Humus content ranges from 2.32 to 3.01%, which classified this soil in a soil group with moderate humus content. The humus surface horizon potential of 10 to 15 cm depth is textured according to the following composition: loam to clay loam soil, while in the deeper strata or subhorizons to 150 cm depth, the texture classes are: sandy loam, loam and clay loam. Such a mechanical composition results in a relatively favorable water-air properties which is complemented by moisturizing with the groundwater, and its periodically raising and decreasing below the height of the lower limit of the surface horizon. On the basis of examined characteristics of these soils, as well as their geographical distribution within the bottomland of the Sava River, it can be concluded that the soils have the potential for the cultivation of broadleaves from a complex of the alluvial hygrophile forests, or clonal mixture: euro-american poplar (*Populus x euramericana* x (Dode) Guinier), american black poplar (*Populus deltoides* W. Bartram ex Marshall) and white poplar (*Populus alba* L.).

Key words: *Hydromorphic soil, bottomland, populus, the Sava river.*

CONTRIBUTIONS OF MULTI-SITE PROVENANCE TRIALS TO INVESTIGATE GENETIC DIVERSITY OF FOREST TREES POPULATIONS ASSOCIATED WITH GEOGRAPHY

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Abstract

Provenance in forestry refers to the population of trees growing at a particular place of origin. Provenance research defines the genetic and environmental components of phenotypic variation associated with geographic source. This article summarizes the results from a Serbian - wide series of 24 provenance trials of native provenances of Douglas fir (*Pseudotsuga menziesii/Mirb./Franco*) from the USA and 7 provenance trails of native provenance of Norway spruce (*Picea abies Karst*) from Slovenia and Serbia. The seedlings from all collection locations are planted together in a systematic experimental design on multiple sites. Multi annual research included comparative analyses of intra- and inters- provenance variability of several quantitative characters: a) trees ¬– volume, basal area and volume increment, as well as of qualitative characteristics: a) the main physical and mechanical properties of felled stem wood at the height from 0.3 to 1.3m. The data on the variability of air temperature and precipitation at the study localities were obtained from the Republican Hydro-Meteorological Institute of Serbia. The effects of air temperature and precipitation on the study parameters were determined by Pearson's correlation coefficient. Environmental differences between the location of origin and the planting (test) site have been calculated by principal component analysis and termed ecological distance. Consideration of ecologically important genetic variation within species is important and this information should be integrated into seed collection strategies for ecological restoration. The aim of these analyses is to study the interaction between the genetic potential of the introduced provenances and the environmental conditions at the provenance test sites, aiming at the more reliable selection of forest-economic works on the establishment, silviculture, tending and utilisation of Douglas-fir and Norway spruce plantations.

Key words: *provenance trails, genetic diversity, geographic sources.*

STAND CHARACTERISTICS AND REJUVENATION IN SESSILE OAK FOREST (*QUERCETUM PETRAEAE CARICETOSUM PILOSAE* JOV. 1975) ON NATIONAL PARK FRUŠKA GORA IN SERBIA

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Abstract

This paper presents the results of research on the stand state and regeneration treatments in sessile oak forests on area of National Park Fruška Gora in Serbia. The study stand belong to the ecological unit of sessile oak forest with hairy sedge (*Quercetum petraeae caricetosum pilosae* Jov. 1975) on ilimerised soil (luvisol) on sandstone. The stand is even – aged, vegetative origin, 110 years old. It is located at an altitude of 390 *m*, on northwestern exposure and inclination over 12^0. Initial stand state is characterized by the total number of trees 136 per *ha*, and volume is 177.23 m^3/ha. The mean stand diameter is d_g = 39.3 *cm*, and the mean stand height is h_{dg} = 23.4 *m*. The stand is medium – tended and it is characterized as a quality coppice forest on preserved habitat. The silviculture aim is stand with generative origin and silviculture treatment is conversion to high forest. The stand is in phase of natural regeneration by shelterwood cutting. In the year of abundant acorn production in 2005 it was conducted combination of prepratory and regeneration cut of shelterwood cutting with application selective removal of undergrowth floor of acompying species - silver lime, hornbeam, manna ash. In the third year of age was conducted subsequent cut of shelterwood cutting with removing blackberries. After conducted subsequent cutting with intensity about 47% per number of trees and volume, number of young plants of sessile oak is 23.3 per m^2. Young plants are evenly distributed over the entire surface and have a good quality.

Key words: *Fruška Gora, sessile oak, stand state, rejuvenation, Serbia.*

EDAPHIC AND PRODUCTION CHARACTERISTICS OF BLACK LOCUST STANDS IN MANAGEMENT UNIT „MUZLJANSKI RIT“

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Abstract

In management unit „Muzljanski rit“ black locust (*Robinia pseudoacacia*) is the second most common tree species. Black locust in MU „Muzljanski rit“ cover 218,83 ha, what is the 16,41% of total area of management unit. Black locust stands are mostly appearing on humogley (riparian black soil) with total area of 212,70 ha (97,20%). In V and VI age class was detected total area of 114,99 of black locust stands. Humogley is most common soil type in this age class to with 110,15 ha (occurrence of 95,78%). Under black locust stands on meadow black soil – salinated and on β/γ gley we can find ~~to~~ nearly 4% of total area. Black locust stand volume on riparian black soil in V and VI age class from 0 up to 50 m^3ha^{-1} is recorded on 44,13 ha or on 40% of area, and from 51 up to 100 m^3ha^{-1} on 27,36 ha of area. The total area of black locust stands under 100 m^3ha^{-1} on riparian black soil is about 65% of area. Only on 2,33 ha or 2,12% of the area we can find black locust stands over 150 m^3ha^{-1}. Black locust stands in V and VI age class in MU Muzljanski rit we find on meadow black soil – salinated on 4,71 ha (4,10%) and slightly on β/γ gley. We recorded average volume from 21,85 to 33,83 m^3ha^{-1} on black meadow soils, and only 2,29 m^3ha^{-1} of β/γ gley.

Key words: *black locust, Muzljanski rit, humogley – riparian black soil.*

FOREST STAND MANAGEMENT OF *QUERCUS ROBUR* AND *Q. PYRENAICA* IN GALICIA (NW SPAIN) REGARDING ENVIRONMENTAL FACTORS

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Abstract

The aim of this work was to study forest stand management of two oak species that inhabit the major surface in Galicia (northwestern Spain), *Quercus robur* L. and *Quercus pyrenaica* Willd. To achieve this goal, we have started with the characterization of the forest site occupied by natural forests of both species. Since some parameters have greater meaning than others regarding environment descriptors, we carried out a discriminant plot analysis for each species in order to identify parameters with greater descriptive weight, using the program Two-Way Indicator Species Analysis (TWINSPAN). This analysis is based on the estimate of 25 ecological parameters (i.e., topographical, climatic and edaphic) through sampling of 39 *Quercus robur* and 40 *Q. pyrenaica* plots. The results demonstrate that the distribution of oaks is related principally to the climate and the topography, and to a smaller extent to soil factors. Therefore, it is necessary to find out silvicultural treatment alternatives in order to obtain economic production that would be more profitable than the one being obtained now with traditional methods and inadequate forestry practices (pollarding and felling of the best trees). Some alternative methods could be the following ones: i) conversion to high forests, ii) maintenance of coppice forests in areas of certain quality and homogeneity where firewood is still used, iii) silvopastoral improvement in zones with grazing importance, and iv) restoration of degraded stands through reforestation with other native broadleaved species.

Key words: *Ecological factors, northwestern Spain, TWINSPAN, oak species.*

USE OF AIRBORNE LIDAR DATA FOR FOREST MANAGEMENT APPLICATION: A CASE STUDY FROM TURKEY

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Abstract

A serious problem to forest managers has been the difficulty in obtaining horizontal and vertical information about forest structure at useful resolutions and accuracies. This paper covers, how LiDAR data were used to estimate five forest stand parameters (total mean volume, basal area, mean tree diameter, mean tree height, and number of stems per hectare) for Belgrad Forest in Istanbul in Turkey. The Airborne LiDAR data were used to generate pattern maps of forest stand parameters for input into a LiDAR based forest inventory model. The result indicate that LiDAR metrics are significant predictors of mean tree height (r2= 0.92), basal area (r2= 0.79) and total mean volume (r2= 0.73). The experimental first results showed that our method worked well for the forest stand parameters delineation based on Airborne Lidar data, and LIDAR was no longer an experimental technique and became accepted as a source of accurate and dependable data suitable for forest inventory and assessment.

Keywords: *LiDAR, ALS, forest inventory, forest stand parameters.*

ENVIRONMENTAL IMPACTS OF MODIFIED FARM TRACTOR AT FOREST HARVESTING OPERATIONS IN TURKEY: A CASE STUDY OF BAHCEKOY FOREST ENTERPRISE

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Abstract

Harvest systems consisting of farm tractors and skidders are the most popular systems for timber harvesting in Turkish forestry. The modified farm tractors are used in many regions in Turkey. In many regions of the world, farm tractors have been used in forestry where the terrain conditions and the size of the forest operation are not limiting. The modified farm tractors are used generally on skid roads and skid trails inside harvesting area. The skid roads are constructed in a simple way. For skid trails, gaps in the forest are used. Logging is perceived to be one of the major causes of damage to forest vegetation. The planning operations for wood extraction require careful consideration not only to minimize cost but also to reduce the negative impacts on forest soil and trees inside stands. Especially, damages on forest soils occur during skidding of timber. The types of damages on soils are traces, erosion and splitting. Soil erosion can occur in damaged area in next years. The skidding operations with tractors and transporting operations with cable systems can be given trees and saplings in stand. This damages type on trees and saplings is generally in the form of bark injury. Study area is managed by Bahcekoy Forest Administration and this area was located in northern Turkey. The study area is a black pine (*Pinus nigra*) stand. In this study, the farm tractors were used to different shapes as skidder, loader and tractor trailer. Environmental impacts of skidding operations and loading operations were investigated in harvesting area and on the skid roads. The types of damage were determined during the harvesting and transporting operations.

Keywords: *farm tractor, skid road, skid trail, environmental impacts.*

THE IMPORTANCE OF DRAINAGE CONSTRUCTIONS IN THE FOREST ROAD PLANNING

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Abstract

The forest roads provide access to forest resources in carrying out main forestry activities such as protection, afforestation, management, recreation and firefighting. The planning operations are very important in terms of economy, environmental impacts, work safety etc. The useful life of forest road due to drainage structures is prolonged. The drainage structures and protective structures used in forest roads are various in types. These are dip drains, pipes, culverts, bridges, water-bars and walls. The main task of all drainage structures and walls is protecting against external aggressors to the forest roads. The planning and constructions operations of drainage structures are very important. The occurring errors by planning and constructions operations shorten the life of drainage structures. The occurring errors by planning and constructions operations are shortened the life of drainage structures. Especially, the mistakes during planning works of drainage structures are constituted major problems. These problems are large or small cross section of drainage structures, mistake of positioning, materials and mistake regarding size of drainage structures etc. In this study, the planning and construction operations of drainage structures on forest roads were investigated. In the results, locations and constructions of some drainage structures were determined to be incorrect and errors were revealed. At the end of the study, various suggestions were made according to the mistakes made in the planning of the drainage structures.

Keywords: *Drainage construction, Forest road, Culvert, Pipe, Dip drain.*

CANOPY GAP CHARACTERISTICS IN A RESERVED ORIENTAL BEECH FOREST, NORTHERN IRAN

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Abstract

Canopy gap characteristics were investigated in a reserved oriental beech (*Fagus orientalis* Lipsky) stand in the Caspian forests, northern Iran. Seventy six percent canopy gaps were sampled at 5 transects of 625 to 2000 m parallel to slope contours. Gap area was estimated using field method of measurement of non-convex polygonal. Transects were separated by 50 m to ensure that large gaps are not sampled more than once. Median and mean area of gap was 120.7 and 159.2 m^2, respectively. Mean canopy gap fraction was 8.4%. Most frequent gap makers (36%) belonged to DBH class of 82.5-107.5. Sixty eight percent of canopy gaps were smaller than 200 m^2 but only 1.4% bigger than 500 m^2 consisting of 5.8% proportion of the total gap area. The proportion of middle gap sizes (100-500 m^2) was nearly 5 fold of gaps of smaller than 100 m^2. The maximum of gap-makers per gap was 6 trees but 56.6% of gaps were formed by the death of up to 3 trees; 43.4% of gaps were expanded after the initial gap formation, due to recurrence of disturbance events. Most (60.4%) of the gap-makers were at medium and old decay stages; 4.5% of gap-maker species and 12.4% of mortality mode of gap-makers were unknown. However, 60.4%, 19.3%, 5.8% and 2.1% of the all gap-maker trees were snapped-alive, uprooted, snapped-down and standing-dead (deadwood), respectively. Exogenous agents, such as chronic winds, could have a prominent role in initial formation and expansion of canopy gaps.

Keywords: *disturbance regime, canopy gap, gap-maker, gap fraction.*

EFFECTS OF RETENTION IN FOREST THE DRAINAGE WATER FROM AGRICULTURAL AREA

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Abstract

The poor quality of the Baltic Sea waters is a serious environmental problem, but also negatively affects the efficiency of maritime economy and the health of the population, the development of tourism, etc. One of the important sources of the Baltic Sea pollution is agriculture. The large amounts of nitrogen and phosphorus compounds from Poland to the Baltic come from drainage systems of agricultural land. In order to reduce these loads water from drainage systems is retained, among others, in water ponds on agricultural area. Besides the problem of water pollution, for the last 30 years water resources in Poland have been reduced mainly due to climate change. This phenomenon also occurs in the forests, so it is considered to retain the drainage outflow from agriculture area in the forests area. However, there is a fear whether the biogenic compounds contained in drainage waters will not harm the forest ecosystem. In order to verify this question, a pond was constructed in the forest for water from drained agricultural land. The quality of water flowing from farmland to pond as well as quality of groundwater at different distances from the reservoir was investigated. The paper presents the technical solution of the water retention system in the forest as well as the load of nitrogen and phosphorus compounds retained, which does not pollute the Baltic Sea. The results of research indicate that so far changes of groundwater quality in the vicinity of the pond don't threaten the forest ecosystem.

Key words: *Baltic Sea pollution, drainage outflow, water retention, forest.*

THE VULNERABILITY TO CLIMATE CHANGES OF PINE FOREST CULTURES FROM OUTSIDE THEIR NATURAL RANGE

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Abstract

The pine forest cultures installed outside their areal are exposed to the action of some harmful abiotic factors (drought, wind, snow), being rather vulnerable and sometimes suffering from important assaults, so that their ecological reconstruction is a necessity. The pine cultures from outside the areal were realized starting with the year 1972, by replacing some derived stands (linden stands, hornbeam stands etc.) or low productivity *Quercus* stands. They were intended for the production of colophon, but also for wood production. During their evolution, in the absence of a guiding scientific substantiation, the risk that these stands should be harmed by the action of harmful factors before they reach the intended cycle has increased. In order to substantiate the ecological reconstruction methods of the affected ecosystems, the monitoring/evaluation and their structural-functional analysis are necessary. The current paper presents the results of the investigations regarding the structure (structural parameters and structural diversity) of some pine stands situated in the forest steppe area from the East part of Romania. Analysis of the structure of the stands is very important for determining the stand's degree of assault and vulnerability, regarding which urgencies and methods of restoration can be established. In order to establish the ecological reconstruction solutions, experiments have been realized in different situations. The reconstruction of pine stands from outside their natural range is extremely important for preventing the environment's degradation risks and for achieving the protection or production functions of these stands.

Keywords: *pine cultures, natural range, vulnerability, abiotic factors.*

DETERMINATION OF PINUS SYLVESTRIS L. TRUNK DIAMETER BASED ON STUMP DIAMETER IN DIFFERENT BOREAL CONIFEROUS FOREST CONDITIONS OF PERMSKII KRAI (RUSSIA)

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Abstract

Sometimes there are situations when it is necessary to determine the size of cut logs in the logging area in its absence. Mostly such situations arise in the detection of illegal logging. They can also occur in the case legal harvesting, when the tenant of a forest plot does not receive the scheduled volumes of timber for which he paid the money. In this case, the diameters of the felled trees are determined by the tree stumps. Recalculation of diameters is carried out on special tables developed in the early 20th century. Studies conducted in Krasnoyarsk, Khabarovsk, Bryansk (Russia), Gomel (Belarus), showed the need to refine the data of scaling tables for local conditions. Large discrepancies between actual and tabular trees appear with the increasing diameter of the tree. Studies of the relation of the formation of the butt log of pine (*Pinus sylvestris* L.) in the Perm region was carried out in 2015-2016. Forest plots were selected in different forest types of the middle taiga (Nirobskii forestry) and southern taiga (Perm urban forestry). Measurement of trees was carried out in pure pine stands at the age of 75-130 years. The stand density of the plantings was of 0.6-0.8. In each forest type the replication of studies was threefold. Studies have shown that trunks of pines formed a fuller bole in the Perm region, than the established scaling tables. For trees 40 cm in diameter, recalculation leads to underestimation of the pine tree trunk diameter by 1-2 diameter class. That is understating the actual volume of felled tree by (16-20 %). There were no significant differences in the formation of the pine bole between the forest zones or by the corresponding types of forest. Also, there were no significant differences between forest types, which allows using a single conversion scale for the taiga part of the Perm Territory. Due to the fact that the relative completeness of the comparative stands were close, the influence of the distance between the trees on the development of the butt of pine trunks was not detected.

Key words: *illegal logging, diameter of pine stump, forest type, middle taiga, southern taiga, boreal coniferous forest.*

IMPACT OF THE FUNGAL PATHOGEN *ENTOMOPHAGA AULICAE* ON BROWNTAIL MOTH PARASITOIDS

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Abstract

In the period 2015-2016, parasitoids of the order Diptera of the browntail moth *Euproctis chrysorrhoea*, some of the most economically harmful, outbreaking species of forest defoliators, were studied in 12 forest stands in the region of Novi Pazar (south-west Serbia), in which the browntail moth increased its numbers and where the entomopathogenic fungus *Entomophaga aulicae* was found. In the investigation period, 40 newly browntail moth litters were collected and analyzed. In the litters, there were 388 pupae, of which 23% were parasites from the order Diptera. Host mortality caused by parasitoids in different localities varied from 11.2% to 33.1%. A total of 89 Diptera pupae were reared from browntail moth pupae. Out of these, 83 died as pupae, resulting in an extremely high overall mortality of 93.2%. Only six tachinid adult specimens of 2 species (*Compsilura concinnata* and *Exorista larvarum*) emerged from tachinid pupae. In a detailed microscope survey, *E. aulicae* resting spores were observed on the surface of 72.8%, but not in internal tissues of the dead pupae. The lack of resting spores inside the dead Diptera pupae is an indication of the absence of direct effect of fungal pathogens on parasitoids. The Diptera evidently does not become infected by *E. aulicae* while parasitizing the infected host, but the presence of resting spores on the surface of Diptera puparia is the evidence of the development of the entomopathogenic fungus in parasitized browntail moth larvae and pupae. The causes of Diptera mortality during their development in host parasitized by *E. aulicae* have not been clear enough but it is likely a result of the competition between the fungus and parasitoids.

Key words: *Entomophaga aulicae, impact, browntail moth, parasitoids.*

EFFECT OF SALINITY ON GROWTH AND DEVELOPMENT OF WHITE POPLAR SHOOTS *IN VITRO*

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Abstract

The study tested the effect of salinity on growth and development of the shoots of five white poplar (*Populus alba* L.) genotypes in culture *in vitro*. After 35 days of cultivation following characters were measured: height of shoot, number of roots, length of the longest root, percentage of survival and rooting. The effect of six different concentrations of NaCl in the standard rooting medium (1 mM, 3 mM, 10 mM, 33 mM, 100 mM and 150 mM), and the standard rooting medium without salt (used as Control) were studied. The medium with 150 mM NaCl produced toxic effect, so these explants were excluded from further statistical analysis. The salinity tolerance of examined genotypes was evaluated by tolerance index by Turner and Marshal (TI), calculated for every examined character. According to analysis of variance, the main effect of medium was significant, but not the interaction genotype × medium for all of examined characters. Considering significant genotypes' differentiation and significantly lower tolerance indices compared to others on the most of characters, medium with 100 mM NaCl was proposed to be used for the evaluation of white poplar genotypes *in vitro*. The best tolerance achieved genotype L-80, which had the highest tolerance index for the length of the longest root. Results of this study suggest that *in vitro* culture could be usefully implemented in evaluation of salt tolerance of white poplar genotypes.

Keywords: *Populus alba, micropropagation, salt tolerance.*

EVALUATION IN BIO-COMPOSITE FILM PRODUCTION OF SOME AGRICULTURAL PLANTS GROWING IN TURKEY

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Abstract

Plenty of and a large variety agricultural resources are grown in different regions of Turkey and abundant wastes emerge from these. Owing to their large amounts, storing or annihilating of them is not too easy. Nonetheless, these materials can be evaluated in a lot of purposes. One of these is bio-based composite films. It is known that the bio-composite films are more eco-friendly and biodegradable than the petroleum-based products. In production of bio-based composite materials, agricultural plant wastes have to be converted the nano/micro scale to disperse in the films homogeneously. According to sizes and obtaining methods, separated fibers are termed as microfibril (MF), microcrystallinecellulose (MCC), nanofibril (NF), nanocrystallinecellulose (NCC) or cellulose whiskers (CW) etc. in the literature. Micro/nano fibers have some advanced mechanical, physical and thermal properties. Therefore, the composite films produced with these materials can be preferred in industries like medical, electronic, coating etc. instead of plastic-based materials. In this study ten different agricultural wastes growing in Turkey were selected. Wheat straw, barley straw, rye straw, rice straw, sunflower stalk, cotton stalk, corn stalk, tobacco stalks, reed and hemp were collected from different regions and their anatomical, chemical and morphological properties were discussed for producing bio-composite film. Consequently, while hemp fibers were the longest fiber length, cotton and tobacco fibers showed the shortest fiber length. Also the lowest lignin content and the highest cellulose ratio were found in hemp. Although all lignocellulosic materials can be used for nano/micro crystalline cellulose production, some of them need additional pretreatment processes.

Keywords: *Agricultural resources, nanofibril, bio-composite film.*

EFFECTS OF DIFFERENT SOWING DEPTHS AND GROWING MEDIA ON GERMINATION OF BLADDER-SENNA (*COLUTEA ARMENA* Boiss. & Huet.) SEEDS

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Abstract

This study was carried out to determine which sowing depth and growing medium should be preferred to increase germination percentage of *Colutea armena* seeds. Treatments applied to the seeds were 3 different sowing depths (0.5 cm, 1 cm and 1.5 cm) and 4 different growing media (forest soil+sand+manure (2:1:1); peat+manure (2:1); peat+perlite+manure (2:1:1) and peat+forest soil+manure (1:1:1)). The seeds were submersed in concentrated (98%) sulphuric acid for 30 minutes to overcome seed dormancy. The seeds were sown in pot-trays at 24±1°C in the greenhouse. The statistical approach was a randomized complete block design with three replications and 60 seeds were used for each replication. Germinated seeds were observed periodically during 42 days to determine germination percentages and germination rates. Both the highest germination percentage (31.1%) and germination rate (9 days) were obtained in seeds which were sown in the medium of forest soil+sand+manure (2:1:1), in 0.5 cm-sowing depth. On the other hand, the lowest germination percentage (2.8%) was determined from the seeds which were sown in 1 cm-depth in the growing medium of peat+manure (2:1).

Keywords: *Colutea armena, germination, sowing depth, growing media.*

THE INFLUENCE OF LIGHT FACTORS AND COMPETITION AMONG THE CROWN OF THE ALLEY TREES OF *TILIA TOMENTOSA* (MOENCH) IN THE URBAN AREA OF SARAJEVO (BOSNIA AND HERZEGOVINA)

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Abstract

This paper analyzes the influence of light factors and competition between alley trees on development and deformation of the silver linden. Researches were carried out on the alley´s silver linden trees of different age in urban green areas of Sarajevo (Bosnia and Herzegovina). Research have shown that light is a key factor for the development of silver linden tree crown, and that the eccentricity of the crown to a greater extent occurs in the age of over 60 years. The deformation of the crown is particularly conspicuous towards the open side where the most light comes from. The silver linden is extremely responsive to light, therefore in the course of forming an alley it must be taken into account the planting distance, direction of the alley, and the intensity of sidelight that should be in optimum during the growth and development of alley. At afforesting the semi-urban barren lands, i.e. forming of urban forests or park forests using linden, it should be taken into account the planting distance and the edge of the stand, as the deformation of the crowns occurs most frequently with marginal trees. With thinning activities it is possible to optimize the amount of light within the forest, necessary for proper development of the crowns and the good stability of the trees, and by the planting of other tree species on the edge of urban forest, it can be avoided the deformation of the marginal silver linden trees and other species of linden used in forestry and urban forestry.

Keywords: *the influence of light, eccentricity of the tree crown, Tilia tomentosa Moench, Urban forestry.*

UTILIZATION ASPECTS OF PRIVATE FORESTS IN SELECTED DISTRICTS IN WESTERN AND EASTERN SERBIA RELEVANT TO THE LEGAL FRAMEWORK, SOCIOECONOMIC INFLUENCES AND PROPERTY RIGHTS

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Abstract

Following the results of the last National Forest Inventory Serbia is a medium forested country with forest coverage of 29,1%. State owned forests cover an area of 53%, while private forests are represented with 47%. Private forests are characterized by small property size, high fragmentation, and high numbers of owners, but these forests are very important, because they have significant potentials in production of wood and non-wood forests products, carbon storage, and biodiversity protection. Utilization of private forests depends on reasons such as property size, fragmentation of the property, main purpose of forest use etc. Research that was done during the 2012, examined socioeconomic aspects and attitudes of private forest owners within the selected districts: Zlatiborski (Western Serbia) and Borski (Eastern Serbia). The main results of this research showed that in relation to property size, the average was determined as 4,12 ha per owner, where the biggest property size was 92 ha, while the smallest one was just 0,09 ha. Average number of parcels per owner was 3,91, and these properties were in 87,5% inherited, while only 2,5% of properties were bought by their owners. Concerning the utilization of forests, 86,5% of interviewees named firewood production for personal use as the main reason for utilization. The biggest problems during the forest management and utilisation were recognized as missing of appropriate equipment for utilisation, bad condition or shortfall of forest roads and complicated administrative procedures for timber production, transport and trade. Definition of issues and problems concerning private forests management could provide a solid base for defining a platform on national level, for better management and utilisation of private forests.

Keywords: *Private forests, Private forest owners, Utilization, Property rights, Serbia.*

STAKEHOLDERS' ATTITUDES TOWARDS THE HUNTING SECTOR IN SERBIA: REGULATORY FRAMEWORK AND WILDLIFE PROTECTION SYSTEM

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Abstract

The aim of this paper is to analyze the regulatory (strategic and legal) framework of the hunting sector in Serbia and the system of wildlife protection, as well as the stakeholders' attitudes towards it. Primary and secondary data were used for conducting such an analysis. Secondary data were collected from national strategic documents, laws and by-laws. Primary data were collected by using face-to-face and e-mail interviews, which were conducted with 13 professionals from public administration, services and organizations, responsible for hunting in Serbia. The results show that, although in Serbia there is no single strategic document in the hunting sector, a number of other sectoral strategies (forestry, agriculture, spatial planning, biodiversity, etc.) have an impact on it. Similarly, a number of laws are important for hunting issues in Serbia. In addition to being influenced by the Law on wildlife and hunting, the sector is affected by the legislation in the following fields: forestry, environmental protection and nature conservation, associations, weapons and ammunition, etc. The results of the analysis of the stakeholders' attitudes indicate the necessity of adopting a strategic document for the hunting sector. Most of them believe that the current legal framework is good and that it provides the framework for sustainable hunting management in Serbia. At the same time, they stress the need for certain amendments to the existing law and by-laws, so that implementation would be better. On average, the respondents see the current system of wildlife protection as "neither effective nor ineffective" (avg. grade 2.8). On the other hand, they believe that the current system of penalizing persons engaged in illegal hunting as "ineffective" (avg. grade 1.8). The explanations of such a low grade of system efficiency are: mild penalties, long court processes, and lack of a control system.

Key words*: hunting sector, stakeholders, regulatory framework, wildlife protection.*

INSTITUTIONAL FRAMEWORK, COOPERATION AND MEASURES FOR THE SERBIAN HUNTING SECTOR IMPROVEMENT

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Abstract

This paper presents the analysis of the institutional framework and measures for the improvement of the hunting sector in Serbia. In addition to that, the paper deals with cooperation and relations between institutions and organisations, in charge of several aspects of hunting in Serbia. For data collection, 13 face-to-face and e-mail interviews with hunting experts from public institutions (administration and services), and organizations (enterprises and associations) were conducted. The respondents' perception of the institutional framework of hunting, the current state of hunting grounds management, cooperation with other institutions and organizations and available measures for the improvement of the hunting sector were analyzed. Two respondents have a positive opinion about the work of public administration responsible for hunting. The largest number of them believes that the Forest Directorate lacks personnel and that improvements should be made in that direction. Only three respondents consider the current organization of hunting grounds management in public enterprises in Serbia satisfactory, while only one of them has the same opinion about hunting grounds management in hunting associations. The respondents have given the highest average grade to the cooperation with the Hunting Chamber of Serbia (4.4) and the lowest grade to the cooperation with the Hunting Association of Serbia (2.7). The majority of respondents notice the following obstacles to the improvement of the current state of hunting management: lack of funding, personnel structure, technical infrastructure and the system of organization. Around half of the respondents believe that an organized system of implementation of support measures for hunting development is present in Serbia. They explain that it is prescribed by the law (regulatory, financial, and informational measures). The other half of the respondents believes that Serbia is lacking such a system, because there is neither an overall hunting strategy nor an action plan. They stress that some measures exist (e.g. Budgetary Fund for Hunting Development, education organized by the Hunting Chamber), but also that these are not defined or implemented in a systematic way.

Key words*: hunting sector, institutions, organisations, cooperation, support measures.*

VEGETATIVE PROPAGATION OF ELITE TREES OF CORNUS MAS L. IN THE BELGRADE AREA BY SOFTWOOD CUTTINGS

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Abstract

The Cornelian cherry is ornamental, low maintenance, drought-resistant species, which has the high potential for sustainable organic production as valuable fruit species. It can grow on shallow soils and on the different soil types, from sandy to clay soils, having good potential as a species for erosion control. In this study, the effect of cutting type and auxine concentration on rooting of softwood cuttings of cornelian cherry was investigated. Different types of cuttings were taken from selected mother trees in the urban forest in Belgrade area. Cuttings were treated with auxine (0.2% or 1.0% IBA, indole-3-butyric acid) before sticking and rooted under intermittent mist. The obtained data (the rooting percentage, the number and length of primary roots, the frequency and the number of secondary roots) were statistically analysed and the obtained results showed that cutting type, cutting size and auxine concentration influenced rooting of cuttings. Cutting length didn't affect rooting percentage but affected the number of primary roots and the longer cuttings had more primary roots Best results (more than 90% rooted cuttings) were achieved with terminal cuttings treated with 1% IBA.

Keywords*: Cornus mas, IBA, green cuttings, auxine, vegetative propagation.*

CARBON STORAGE IN SHELTERBELTS IN THE AGROFORESTRY SYSTEMS OF THE BAČKA PALANKA AREA (SERBIA)

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Abstract

Field shelterbelts as agroforestry practice provides numerous ecosystem services. Carbon capture and storage potential in biomass and soil is among regulating services shelterbelts provide. Designing shelterbelts to address the various demands and provide services, requests special attention to choosing structural and spatial characteristics of shelterbelts, and species selection for shelterbelts. This paper presents the research results of C storage in 20-years old shelterbelts established on Gleyic Phaeozem in the area of Bačka Palanka (Serbia). Investigated shelterbelts were consisted of the most commonly used species for shelterbelt establishment in Serbia: Siberian elm (*Ulmus pumila* L.), poplar (*Populus x euramericana* (Dode) Guin. cv. „Serotina“) and black locust (*Robinia pseudoacacia* L.). The diameter at breast height (d) and the height (h) of all trees in studied shelterbelts were measured. Carbon stock in biomass was estimated according to IPCC (2003) methodology. Soil profiles were opened in studied shelterbelts with soil sampling carried out at fixed depths of 0-10 cm, 10-20 cm and 20-40 cm. Assessment of carbon storage in soil was performed according to IPCC (2003). According to the research results, living biomass C stock in 20-years old Siberian elm and poplar shelterbelts per tree is almost the same 0.333 t per tree and 0.300 t per tree, respectively. In black locust shelterbelt carbon stock is considerable less 0.111 t per tree. However, in species selection for shelterbelts some characteristics should take into account such as adaptability and suitability to the environmental conditions, longevity and their impact on crops that are grown in the sheltered fields, as well as the natural potential vegetation communities of the area. The results of this study indicate that the poplar is preferred species than the Siberian elm in given environmental conditions. The average carbon stock in the soil of studied shelterbelts in a layer 0-40 cm is 9.33 kg m^{-2} C.

Keywords: *agroforestry, field shelterbelts, carbon storage, species selection*

AUTOMATED MAPPING WITH LiDAR AND SPECTRAL CHARACTERIZATION IN MEDITERRANEAN FOREST AGROECOSYSTEMS

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Abstract

Mapping with LiDAR data is not a standardized practice, though LiDAR databases are increasing in all countries in Europe. We develop and test a simple method for automated land-cover mapping. The study area was a farm located at a natural park of southern Spain. It comprises 502 ha covered by Mediterranean forest agroecosystems, like dehesa (a very open woodland of scattered evergreen trees used by grazing animals), woodland and scrubland, and transitions among them, composing a heterogeneous landscape. This heterogeneity is caused by variations in holm and cork oak tree density and a sclerophyllous shrub cover, i.e., 3D structure of woody vegetation. Using aerial photographs digitization, Landsat image classification, and image segmentation of tree crowns, land-cover maps were generated. Besides, other maps were produced from LiDAR-derived canopy cover and height of tree vegetation and shrub stratum. These 3D variables allowed to a wall-to-wall characterization of woody vegetation land-cover classes in the study area, that was completed with a NDVI assessment. The results show that automated mapping with LiDAR is reliable and accurate enough in comparison with other mapping techniques. It outperforms them because its higher spatial resolution, and can be combined with other remote sensing methods to provides an improved understanding of the forest landscape.

Keywords: *Canopy, Dehesa, Forest structure, GIS, LiDAR, Vegetation structure*

SELECTION OF ALMOND (PRUNUS AMYGDALUS L.) GENOTYPES GROWING IN THE FOREST AREA OF HILVAN (SANLIURFA) DISTRICT, TURKEY

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Abstract

Turkey has a wide genetic variation for almond species (*Prunus amygdalus* L.) in some of its regions due to open pollination (heterozygous) conditions and seed propagation since thousands of years. This study was conducted to almond genotypes grown in forest area of Hilvan district of Şanlıurfa province of Turkey between the years of 2011-2012. Because no studies have been made on almond genotypes in forest area of Hilvan (Sanliurfa) district by researchers up to now, the research in this natural habitat has a special importance with respect to promising almond genotypes. Therefore, the aim of the study was to select superior genotypes from native almonds populations grown from seed in this area. At the begining of the study, 152 genotypes were sampled from native populations according to some selection criterias. At the end of the study, 9 promising genotypes were selected using standard selection criterias for almonds. The first, full and last flowering dates of the almond genotypes were recorded as 9-10 March, 14-15 March and 19-20 March, respectively. The latest flowering date was observed in 63-HVO-32 numbered genotype. In the study, fruit weight with shell, kernel weight and shell thicknes of the promising genotypes were ranged from 2.29 (63-HVO-32) – 6.31 (63-HVO-25) g, 0.53 (63-HVO-65 and 63-HVO-103) - 1.04 (63-HVO-18) g and 2.63 (63-HVO-103) – 4.36 mm (63-HVO-25), respectively. In addition, double kernel and twin kernel ratios of the promising genotypes were determined as 0.00% in all surveyed genotypes.

Keywords: *Almond, Selection, Şanliurfa, Turkey.*

DECAY RESISTANCE OF SCOTCH PINE WOOD IMPREGNATED WITH AGRICULTURAL-BASED CHEMICALS

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Abstract

In recent years, to increase the resistance of wood, wood protection industry has been focused on using agricultural-based pesticides (fungicide/insecticide) in terms of environment and human health sensitivity. In this study, the possibilities of the use of agricultural-based chemicals as wood protection solution against wood destroying fungus were investigated. For that purpose, the decay resistance of Scotch pine (*Pinus sylvestris* L.) wood samples, impregnated with two different agricultural fungicides was examined against the brown rot fungi *Coniophora puteana (Schumach.) P. Karst.* The samples were impregnated by using steeping method at four different concentration levels (1%, 3%, 5%, and 10% by weight). The wood protective efficacy of extract solutions was determined by means of fungi decay test (EN 113). The results indicated that the retention values increased with increasing the concentration levels of the fungal extracts, in all variations. After the decay test, the lowest weight losses were seen in the samples impregnated at the highest concentration levels (10%). Antifungal activity of the agricultural based chemicals was found to be satisfactory especially in 10% concentration.

Keywords: *Agricultural-based chemicals, decay resistance, impregnate, wood.*

IMPACT OF AGE AND RAINFALL VARIATIONS ON RADIAL GROWTH OF *PINUS HALPENSIS* MILL

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Abstract

The comparison of the results of both dendroclimatic and dendrochronological analyses of the Aleppo pine (*Pinus halpensis MILL*) in the state forest of Tlemcen (north of Algeria) was carried out in particular site conditions. The analysis of growth of the annual rings and reports on relative gaps in the successive rings showed a clear regressive trend at the young trees. The average sensitivity (AM) and the respective coefficients of inter-dating (SR) of the young trees and of the most aged ones confirmed there was a fairly strong dependence of the former especially on the climatic factors, precipitation in particular. The results of this work permitted to establish a relation between radial growth and precipitation according to the age of ring formation. Thus, it may be concluded from these results, particularly from the mean sensibility (SM) values, that the climatic variations significantly influence young trees. So to avoid biological and physiological changes linked to tree ageing, it is better to compare the rings on a 40 to 50-year period as it was the case with the six selected samples in the survey zone. Key words: Aleppo pine, annual rings, radial growth, relative deviation, mean sensibility, inter-dating profile, synchronization.

Key words: *Pinus halepensis, radial growth, synchronization.*

HOMOBRASSINOLIDE EFFECTS ON THE GROWTH AND DEVELOPMENT OF NORWAY SPRUCE SEEDLINGS

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Abstract

It is known that phytohormones such as brassinosteroids (epibrassinolide, homobrassinolide et al.) have high biological activity, which is manifested in the regulation of plant growth and development, increase in crop yields, improvement of the structure and quality of the crop, as well as increase in the resistance of plants to pathogens and unfavorable environmental conditions. For the first time, we studied the action of phytohormone homobrassinolide as the preparation "Epin plus" synthesized in the Institute of Bioorganic Chemistry of the National Academy of Sciences of Belarus. The investigations were carried out at different soil and environmental conditions in nursery garden in Belarus on Norway spruce seedlings. The preparation was a solution of homobrassinolide (0,25 g/l) supplemented with nonionic surfactants for better wetting by spraying of the plants. The aim of our research was shortening of seedlings growing in the compacted school to obtain the maximum number of standard planting material per unit area and the increase of biometric parameters of seedlings. The results of the feasibility of application of the "Epin plus" a concentration of $2{,}5 \cdot 10^{-6}$% a.i. for growing plants of Norway spruce. The positive influence of the solution of growth regulator «Epin plus» manifested itself not only in increasing the safety and yield of standard seedlings of Norway spruce, but also biometric indicators and phytomass of plants.

Keywords: *Homobrassinolide, Epin Plus, Growth regulator, Seedlings, Norway spruce, Nursery.*

INVESTIGATION OF PRODUCTIVITY AND COST OF WOOD ENERGY PRODUCTION WITH DIFFERENT SIZE CHIPPERS

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Abstract

Increasing demand for using of renewable energy resources is strongly emphasized during last decades. On the international level it is recognized through series of conventions, conclusions and recommendations. Forests are energy source through conversion of wood biomass into solid, fluent and gaseous fuels for industrial and domestic use.Wood chip is form of biomass, size of 5-50 mm, which is obtained by chipping of lower quality logs, trees, brushwood and wood residues.Some investigation showed that choosing the right chipper is crucial in projection of chipping system. In this study it was compared chipping at the landing site with the Jenz HEM 700 and Pezzolato PTH 1300/1500 chippers. The subject of chipping was beech long fuelwood and stacked fuelwood.Investigation was done with the time and work study method. Cost calculation was performed according to FAO methodology, slightly modified for local conditions.Also, in simulations, Jenz HEM 561 DQ was included in order to cover wider range of chippers by the capacity, but data for this chipper were taken from other research. Unit costs of chipping were calculated on the basis of raw materialinput and chipper output. Unit costs were expressed for factory projected chippers productivity also,in order to compare obtained unit costs with costs when chippers are working below full capacity.Results of the productivity and cost calculation of chippers showed that bigger chippers had lower unit costs, but because of inability to achieve full capacity at forest landing site and because of their dimensions which hinder the manipulation, it can be recommended using of chippers of smaller capacity like Jenz HEM 561 DQ or even smaller.

Keywords: *wood energy, chipping, productivity, cost.*

ECOLOGICAL FACTORS AND CONDITION OF FORESTS IN THE AREA OF MOUNTAIN TREBEVIĆ IN REPUBLIC OF SRPSKA (BOSNIA AND HERZEGOVINA)

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Abstract

Trebević is a mountain located in south-eastern part of Bosnia and Herzegovina, southeast from Sarajevo, 1627 meters high and is adjacent to the Jahorina mountain. In the area of mountain Trebević there is a characteristic vegetation of Dinarids which is represented by forests of beech (*Fagetum montanum ilyricum* Fuk.et Stef.1958.), forests of oak and black hornbeam (*Querco-Ostryetum carpinifoliae* Horv.1971), forests of beech and fir (*Abieti-Fagetum dinaricum* Treg 1957.em.P.cer 1976), forests of beech and fir with spruce (*Piceo-Abieti-Fagetum* Horv. 1967 s.lat), forests of fir and spruce (*Abieti-Picetum illyricum* Horv. et.al. 1974.), secondary forests of white pine and spruce, (*Piceo-Pinetum illyricum* Horv. et.al. 1969.). According to some authors, 99 rare herb species and 14 species of mushroom were found in this area. Mountain area of Trebević has 146.22 ha of private forests in 294 plots with tree supply of 33358.43 m³/ha, also minefield area in 199.87 ha. Forests in a state area equals 841.42 ha with tree supply over 107019 m³/ha.

Keywords: *Trebević Mountain, vegetation of Dinarids, forest communities, condition of forests.*

MULTIPURPOSE PROPERTIES OF SOME PLANTS SUITABLE FOR FOREST GARDENS – DAMASK ROSE, MAULE'S QUINCE, STEVIA

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Abstract

In recent years there has been a change in perception towards gardens in urban and peri-urban areas. In addition to the attractive appearance, plants are also expected to provide a certain benefit to their host, in the form of food, spices, medicine or other. In the city gardens of Banja Luka, Bosnia and Herzegovina, for a long time have been present Damask rose and Maule's quince. In recent years appears the plant stevia. Samples of fresh flowers of Damask rose, fresh fruits of Maule's quince and fresh leaves of stevia were collected from a large forest garden and analyzed on the content of secondary metabolites and antioxidant activity. Analyzes were carried out in six parallel repetitions and the results are expressed as mean value ± standard deviations. The analysis was carried out on the following: total phenols, flavonoids, flavonols, anthocyanins, and monomeric anthocyanin, the effect of the sample on DPPH radical and the ABTS test. Values of listed parameters were compared to data from other countries, since in B&H similar research has not been executed so far. Obtained results indicate that all three observed species exhibit undoubted antioxidant properties, apart from their aesthetic and other use values.

Key words: *Damask Rose, Maule's quince, stevia, secondary metabolites, antioxidants activity*

PLANTING OF TREES RECYCLING TROPICAL TREES IN CAMEROON: ECOSPACE PROJECT

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Abstract

ECOSPACE is a new type of planting of trees recycling tropical trees. It is located in Cameroon. This planting is kept by promoter of the project and national coordinator of the programs of Green Horizon, the founder. Our vision is to plant at least 15000 pines trees in 5 years in order to protect environment and fight against the global warming and against clearing of woods in the world (due to infrastructure buildings in developing countries). It is a measure of biomass production and utilization, since we use fruits from this particular tree as seed, and we are capable to train the community where this pine trees grow in disorder to exploit and cultivate them, and to use them later for their different needs (craft, firewood, wood for building). We just want to recycle these natural resources very available and cheap to recreate the world, and to let the population know how important this plant near to them but unknown by them is. For this we started with 3000 Plants (pine trees) in our nursery production.

Key words: *Ecospace project, tropic trees, Cameroon.*

CONTRIBUTION OF HOME GARDEN FOR LIVELIHOODS IMPROVEMENT AND FOOD SECURITY AROUND WONDO GENET WOREDA AND DALE DISTRICT, SOUTHERN ETHIOPIA

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Abstract

Home garden agro forestry land uses are common in southern Ethiopia. But they are threatened by commercial farming. So this study tries to assess the contribution of home garden practices towards food security and livelihood improvements. The study was conducted both in Wondo Genet and Dale districts, Southern Ethiopia. A two stage sampling technique was adopted to select sample households. A total of 9 (Nine) kebeles were randomly selected from the two districts from which 225 households were randomly selected for an interview. The methods that were employed for data collection were structured questionnaire and home-gardens visit. The data were analyzed by using SPSS version 16 and excel software. The result showed that households have six sources of income generation from which they fulfill their food supplies. These are home gardens, woodlot, farm land production, livestock, small business and employment. Home-gardens contribution was significantly higher ($P<0.01$) for household food security than woodlot and farmland production. The home gardens provide numerous economic and ecological services. The most influencing factors to adopt home gardens are source of income (50%), having sufficient food throughout year (28%) and risk reduction (19%). On the other hand, the most important limiting factors that affect productivity are drought, low capital and finance, lack of land and products, damage by animals and pests in descending order. The farmers mostly utilize family labor followed by hired labor and debo. The results indicated that the existence of three copping strategies (buying, casual work and remittance) to overcome food shortages. More diverse food crops were found in home gardens than farmlands and woodlots. The study concludes, home gardens significantly contribute to food security and improving livelihood in the studied area. Therefore, it is recommended to increase the benefits from home gardens. Education, extension, information, training, credit service and appropriate technologies need to be improved. Clear governmental policies, strategies, and plans need to be formulated to enhance the benefits of home gardens.

Keywords*: Income generation, Woodlot, Farmland, Risk reduction, Diversification.*

FARMERS' INDIGENOUS KNOWLEDGE IN MANAGING AGROFORESTRY PRACTICES IN DECHA DISTRICT, KAFFA ZONE, SOUTH WESTERN ETHIOPIA

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Abstract

Indigenous knowledge is socially desirable, economically affordable, and readily available resource, encouraging participatory decision-making and information, managing agro-forestry practices and contributing to the global knowledge. Therefore, to investigate the hypothesis that farmers, whose agro-forestry practices go back for centuries, have developed an immense knowledge of their agro-forestry practices which can be captured and incorporated in development programmes to improve such practices. Indigenous knowledge must be documented, valued and integrated in order to maximize its usefulness for planning and decision-making. Accordingly, formal and informal surveys were conducted in 2012/2013 in Decha district in six villages of three PAs in order to document the indigenous knowledge of farmers concerning the management of agro-forestry practices. In total, 54 key informants and 66 sample house hold selections and group discussions were made. Farmers' knowledge on the evolution of vegetation cover change, tree and nursery management, management of tree-crop interaction, tree-animal interaction, and soil fertility management in agro-forestry practices was remarkable. Knowledge about the raising and propagating of seedlings of tree species coppicing, thinning, pollarding and pruning was also phenomenal. Tree species were identified on the basis of their compatibility and adverse effects to crops. The most preferred tree species for crop-yield improvement was Dodonea angustifolia followed by Acacia abyssinica, Allophylus abyssinica, Rumex nervosus, Croton macrostachys, Olea africana, and Grewia ferruginea. Eucalyptus globulus, Eucalyptus camaldulensis and Agave sisalina were the tree species considered to have adverse effects to crops by 95.5, 63.3 and 50% of the respondents respectively. It was also recognized by farmers that the plant material would be decomposed and changed into soil. Results obtained in relation to utilization of local trees and shrubs for livestock feed indicated that Rumex nervosus, Allophylus abyssinica, Dodonea angustifolia, Olea africana, Dracaena steudneri and Dombia torrida were some of the trees and shrubs well known to farmers and highly utilized for livestock feeding as indicated by 97, 80, 77 and 77,65 and 59% respondents respectively. The knowledge of feeding season, fodder preferences and adverse effects of tree species on livestock was remarkable. Other uses of local trees and shrubs such as removing of leeches by Allophylus abyssinica as well as fumigation of storage containers for some animal products such as milk by Olea africana were highlighted. The most identified constraints to tree planting were found as free-grazing, land shortage and seedling shortage. Encouraging scenarios were connected with market, good price, credit supply, and construction of water harvesting structures in the management of agro-forestry practices. Many of the tree management and decision activities were done by male.

Key words: *Agro-forestry, Indigenous knowledge, Soil fertility, Tree–crop interaction, Tree management, Vegetation cover change.*

MORPHOLOGICAL STABILITY ANALYSIS OF POPLAR (*POPULUS DELTOIDES* BARTR.) CLONES

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Absract

The assessing of genotype × environment interaction is an important step for Poplar genotypes evaluation in large multi-environment trials. The present investigation entitled "Morphological stability analysis of Poplar (*Populus deltoides* Bartr.) clones" was carried out at the Department of TIGR, COF, Dr. Y. S. Parmar University of Horticulture and Forestry, Nauni, Solan, (H. P.), India -173230 during 2014. There was a collection of 15 clones from different Institutions and maintained germplasm block of Naganji nursery. The multi-location trails were at Dhaula kuan, Sirmaur (H. P.), Ladhhowal, Ludhiana (Punjab) and Naganji nursery, Nauni, Solan (H. P.) in randomized block design with three replication planted at all three location. The observations were recorded on morphological characters, i.e. plant height, collar diameter, total length of leaf, leaf area, length of leaf blade, maximum width of leaf, length of mid rib, length of petiole and analyzed for stability applied Russel and Eberhart (1966) model. For morphological characters it shows highly significant results. Therefore, by applying stability analysis we found that all parameters show the most stable genotypes for all three environments. All sources of variables such as clone, site, and clone x site interaction were statistically significant ($p < 0.01$) in the analysis of variance. The above study suggested that the clones are stable in different environment, therefore they are recommended for implementation in agroforestry systems and for further tree improvement programme.

Key words: *G X E interaction, stability, Poplar, morphological characters.*

IMPACT OF CLIMATE CHANGE ON BIODIVERSITY OF THE WESTERN GHATS MOUNTAIN FORESTS

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Abstract

Climate change together with large-scale encroachment threatens biodiversity of the Western Ghats Mountain forest, a recognized global biodiversity hot spot of Peninsular India. About 27% of all species of higher plants in India is found here, half of them being endemic to the region. Climate extremes and unsustainable use of resources pose serious threat to the existence of many rare and costly medicinal plants, herbs and precious trees. Major hydropower projects submerged large areas of forests. Hill tourism spoils the virgin forests and grasslands. Rainfall in the region is becoming more seasonal and intense, resulting in the erosion of the already degraded soil. Because of long dry season and falling groundwater storage, seasonal plants become extinct. Forest fire from lightning becomes common. Strong winds associated with thunderstorms and tropical cyclones uproot big trees. Shift in regional climate may affect the biodiversity significantly in near future. Many species are unable to adapt to the changing landscape and climate. Rules and regulations for forest protection often become farce because of weak administrative mechanism, corruption and vested political interference. The ongoing national river linking project may adversely affect the forests. There are large areas of restorable degraded forests and afforestable wastelands. Community forest projects with people's participation could protect the forest and improve livelihood conditions of the tribals. Present paper assesses the impact of climate change and environmental degradation on the forest and critically reviews the current policies and strategies for management and adaptation to suggest guidelines for an appropriate forest policy.

Keywords: *climate change, Western Ghats, biodiversity, adaptation, policy.*

EFFECT OF PHYSIOGRAPHIC FACTORS ON TREES AND SHRUBS DIVERSITY AND SOIL CARBON SEQUESTRATION IN THE CENTRAL ZAGROS (CASE STUDY: HASHTADPAHLU FORESTS, LORESTAN, WESTERN IRAN)

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Abstract

In order to study the influence of physiographic factors (aspect, slope and elevation) on diversity of woody plants species and soil carbon sequestration in the central Zagros, a site with maple trees (*Acer monspessulanum Var. cinerscens*) in the Hashtadpahlu region (Lorestan, Western Iran) was selected. For this purpose, 37 circular plots, each measuring 1000 m^2 were set up in a systematic-random design within the site. A total of 11 woody plant species from 7 plant families were investigated in this region. The results showed that the highest diversity of shrub species was observed in the northern aspect and the lower slopes (Class of 5-20%), while the elevation has no significant effect on the shrub diversity. Moreover, the physiographic factors had no significant effect on shrub species richness and tree species diversity and richness. The highest soil carbon sequestration was observed in the eastern aspect, while the other physiographic factors had no significant effect on carbon sequestration. Therefore,the aspect and slope can be considered as the most important factors that affect the amount of species diversity indices in the region.

Keywords: *richness, species diversity, physiographic, carbon sequestration, Zagros.*

INITIAL RESULTS OF HYBRID ASPEN AGROFORESTRY SYSTEM TRIAL IN LATVIA

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Abstract

Most of the countries with term *agroforestry system* understand the same - land use system in which trees are grown in combination with agriculture on the same land. However, because of environmental and pedo-climatic conditions, in practice, the implementation of agroforestry systems differ widely. In these systems Latvian legislation for eseesusing three tree species *Populus spp., Alnus incana* and *Salix spp.* During last few years, there is an increasing interest in different clones of hybrid aspen due to their fast growing characteristics. Latvian State Forest Research Institute "Silava" recently has made several studies to determine productivity, amount of sequestered CO_2 and economic benefits of hybrid aspen (*Populus tremula*L. *x P. tremuloides* Michx.) stand managing it as agroforestry system together with perennial crops - reed canary grass (*Phalaris arundinacea* L.), festulolium (x *Festulolium pabulare*) and fodder galega (*Galega orientalis* Lam.) and fertilized by fermentation residues, waste water sludge and wood ash. Results of the studies showed that the most significant impact on tree growth gives fertilization with biogas fermentation residues (averagely 56,8% better result compared to control), but comparing different intercrops - the best results were obtained with galega and reed canary grass (averagely 16% better results). However, relevant impact on the tree growth has been observed for fertilizer application and the type of intercrop.The most important impact on the plantation productivity has been done by the selection of the hybrid aspen clone.

Keywords: *Agroforestry, Hybrid aspen, Fertilization, Perennial grasses, Legumes.*

CONSERVATION AND VEGETATIVE PROPAGATION OF TWO AGROFORESTRY SPECIES (PINUS PINEA AND CERATONIA SILIQUA) IN THE CONTEXT OF CLIMATE CHANGE IN MOROCCO

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Abstract

Carob tree (*Ceratonia siliqua L.*) and stone pine (*Pinus pinea L.*) are a typical Mediterranean species; they have patchy distribution from Portugal to Syria. These species are recognized not only for their resilience, and wood production but also for their seeds, which are highly prized in international markets and providing higher incomes to their owners than any other agroforestry species. In addition to seed production, stone pine and Carob trees are also widely cultivated around the Mediterranean basin for soil stabilization, windbreak and recreational use. The use of genetic variability is essential in conservation and improvement programs for Moroccan forest species. Several research projects have evaluated the presence of genetic variability among stone pine and Carob tree provenances for survival and growth traits. The objectives of this study were to i) evaluate the genetic variability of the adaptive traits of the two species and to identify provenances/varieties with high performance for growth and fructification traits ii) optimize approach for producing grafted plants for both species under controlled nursery conditions and iii) restore and revalorize degraded areas. Our results show significant differences among provenances in growth traits (height and diameter), indicating that the potential exists to select provenances adapted to stressful site conditions. Among different apical and side grafts techniques tested, T-budding and cleft grafting are successful methods for carob tree and stone pine, respectively. Vegetative propagation techniques are the most promising solution for reproducing these selected varieties and advancing the restoration and domestication of high-value forest tree species. Managing genetic diversity provides long-term benefits for maintaining varieties or clones that are resistant to biotic and abiotic stresses and climate change. Based on the available knowledge and research findings, this paper proposes ideas to build a national strategy for developing and promoting these agroforestry species for reforestation and restoration programs.

Keywords: *stone pine, Carob tree, grafting techniques, clonal selections, variety, agroforestry, climate change.*

THE POTENTIAL OF NON-TIMBER RESOURCES OF FOREST FUND OF RUSSIAN FEDERATION

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Abstract

According to the latest forest inventory accounts, the forest fund of Russia is about 1180 million hectares. Numerous studies have shown that the harvesting of non-timber forest products can be more profitable than harvesting of wood products. Quite often the cost only of forest berries and mushrooms considerably exceeds the cost of timber per unit area (Tutygin, 2000; Kozubov and Taskaev, 2000, Griazkin and Potokin, 2005). In Russian Federation there are unlimited opportunities for environmentally acceptable industrial harvesting of non-wood forest products. The main factors of insignificant use of non-timber production are absence of investments and crediting business related to this sector of forestry. According to the "Annual statistic book 2011" stocks of all berries in forest fund of Russia are estimated in 9,5 million tons, annual honey production is more than 55 million kg and production of sugary trees juices is about 70 thousand tons. Our researches showed that the average productivity of cowberry only in forest fund of Leningrad Region was between 140-560, and blueberry was 120-440 kg/ha (depending on the type of forest). In the near future value of non-wood resources will grow, and its industrial harvesting will allow increasing not only profitableness of forestry, but also employment of population.

Keywords: *non-timber forest production, forest found, forest berries, mushrooms, melliferous plants, tannins.*

RELLATIONS BETWEEN LEAVE'S BIOMETRICAL CHARASTERISTICS AND VITALITY OF NORWAY SPRUCE (PICEA ABIES KARST.) UNDERGROWTH

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Abstract

In this research, special attention was devoted to the correlation between biometric parameters of Norway spruce undergrowth's assimilation apparatus and the life viability of undergrowth. Biometrical parameters, such as mass, length and relative mass of spruce needles can be indicator of undergrowth's capability to change life viability category. Our study shows that positive transition of spruce undergrowth from category of "non-viable" to category of "viable" is mostly related with gradual changes of light conditions after non-clear cuts. All researches were conducted in Leningrad region which refers to the transition zone from the middle to southern boreal forests. There were selected objects with relatively heterogenic soil conditions, but related to same forest type (forest typology by Sukachev, 1961). This study was focused on biometrical characteristics of assimilation apparatus (measuring of average length and weight of needles with their pre-drying) of marked samples of spruce undergrowth before and after decreasing of stand completeness (after shelterwood cuts). Other needles parameters, such as specific weight and the lateral surface area, were defined analyticaly.

Key-words: *assimilation apparatus, Norway spruce undergrowth; vitality of undergrowth; light-conditions; stand completeness*

ESTIMATION OF THE SOIL TOXICITY LEVEL IN FOREST NURSERIES OF SIBERIA

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Abstract

Analysis of the phytotoxicity of soil samples taken under crops of 3-year-old cedar showed that the energy of germination was most intensively decreased by germination on soil extraction selected in the Emelyanovskoye and Taseyevsky nurseries - 70%, while the maximum was for soil selected in the Kozulsky nursery - 85%. In turn, in other variants of the soil selected under the seedlings of the three-year-old cedar, values in the range of 75-78% were established in the Kuraginsk and Dzerzhinsky nurseries, respectively. On average, the germination energy of the test culture compared to the control was low, only 76%. Analysis of the germination of the watercress showed a significant decrease in these values to 77-78% in the Emelyanovskoye and Taseevsky nurseries, as well as in the Dzerzhinsky and Kuraginsky 82 and 85% nurseries, respectively. In general, the maximum germination capacity of the test culture was determined when growing on an extract obtained from the soil of the Kazulsky Forest Nursery – 89%, which characterizes it as low-toxic and for the growth of young seedlings. Thus, the samples of agro-soil of the investigated forest nurseries are non-toxic. The phytosanitary state of crops in the investigated nurseries of the Krasnoyarsk Territory is estimated as satisfactory, the number of dead seedlings averages 20-30%. Anthropogenic load on the soil of nurseries is formed as a result of soil treatment and pesticide exposure, therefore constant control of soil toxicity is necessary.

Keywords: *Assessment, Soil, Toxicity, Seedlings, Processing, Nurseries.*

GROWTH CHARACTERISTICS OF FOUR YEAR OLD SEEDLINGS IN FOREST OF SESSILE OAK IN NORTHEASTERN SERBIA

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Abstract

This paper presents the results of investigation of growth characteristics of four year old seedlings in forest of sessile oak in northeastern Serbia. The stand are phytocenological defined like an association of sessile oak with forest fescue (*Festuco drymeiae – Quercetum petraeae* Janković, 1974) on ilimerised soil (luvisol) on silicate substrate. The stand which are investigated are located at an altitude beetwen 450 and 470 m, on slope up to 15º and southwest exposure. After abundantacorn production in 2012 it was observed spontaneous rejuvenation of stand. In the stand was conducted removal of undergrowth floor of acompying tree species at the begining of 2014 (silver lime, hornbeam, manna ash, field maple) and the rest of trees was removed on the end of 2015 when it was determined satisfactory rejuvenation. On the end of 2016, after ending of vegetation period, growth characteristics of four year old seedlings of sessile oak were analyzed and it was found following: average number of seedlings per m^2 is 23, average height of seedlings is 28.4 cm and average diameter is 4.2 mm. When it comes to quality of seedlings, 88.8% of the total number of seedlings have a good quality, 10.0% middle quality, and 1.2% bad quality.

Keywords: *northeastern Serbia, sessile oak, growth of seedlings, rejuvenation.*

IMPACT *LAETIPORUS SULPHUREUS* (BULL. EX FR.) MURRILL ON DECREASE STATIC MODULUS OF RUPTURE OF THE WOOD

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Abstract

Samples for the research have been taken from the heart wood zone of a sound tree of *Quercus petraea* from the area of Debeli Lug (Serbia), from association *Quercetum montanum* (Čer. et Jov., 1953). In the periods of 2, 4 and 6 months, the samples have been exposed to the impact of the mycelia of the brown rot fungus on oak tree *Laetiporus sulphureus* (Bull. ex Fr.) Murrill (Sulphur Polypore). Effect of to the impact of the brown rot-fungi *Laetiporus suphureus* (Bull. ex Fr.) Murrill was investigated, in decrease of static modulus of rupture *Q. petraea* agg. The static modulus of rupture caused by *L. sulphureus* after 2, 4 and 6 months decreased in comparison with initial ones (100%) and reached 91.73, 75.17 and 63.25%. By using correlation analyses of *Q. petraea* agg. static modulus of rupture - σ_s(dependent variable) of fungi time influence (T-independent variable) strong correlation between variables was established, and regression equation is:

$$\sigma_s = 151{,}514 \pm 30{,}657\sqrt{T}$$

Key words: *Laetiporus sulphureus, Modulus of rupture.*

TYPOGRAPHUS AND SUSCEPTIBILITY TO ENTOMOPATHOGENIC FUNGUS *BEAUVERIA BASSIANA*

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Abstract

One of the factors influencing the abundance of population is intraspecific competition. This intraspecific competition can be used in influencing of gradation of spruce bark beetle populations. Pheromone traps are a common part of monitoring the occurrence of *Ips typographus* in forests. The accumulation of spruce bark beetles in the trap chamber causes the stress situation. This unstable situation raises an intraspecific competition for space resulting in subsequent mutilation among collected individuals. In our experiments, we tested the mutilation of spruce bark beetles depending on the density of individuals in the Petri dish. The rate of mutilation was evaluated by the number of amputated limbs per individuals. A laboratory experiment was carried out to test the infectivity of the entomopathogenic fungus, *B. bassiana*, against spruce bark beetle adults having a different rate of mutilation. The results of the experiments confirmed significant differences ($P < 0.05$) in the proportion of the mutilated individuals, depending on a density of *I. typographus* in test groups. A density of one individual per 1 cm^2 causes an injury of about 93% adults in a testing group. In this case, the infectivity of the entomopathogenic fungus to *I. typographus* was significantly higher ($P < 0.05$) than in the case of uninjured individuals. The aim of the experiments was to demonstrate how could a storage of spruce bark beetle adults before setting up a bioassay affect outcomes of the experiments. This study also casts doubt on the control approach of entomopathogenic fungus introduction to bark beetle environment through combination of a pheromone traps and fungal inoculum.

Keywords: *Beauveria bassiana, intraspecific competition, infection, Ips typographus, vitality.*

Acknowledgement

This work was financially supported by the Slovak Research and Development Agency (grant No. APVV-15-0348).

ET CALCULATOR: AN ARCMAP TOOLBAR TO ESTIMATE ACTUAL EVAPOTRANSPIRATION FROM LANDSAT 8 IMAGERY

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Abstract

Water is the most important constraint facing agriculture in most of the countries. Understanding and estimating the earth's hydrologic cycle is essential for water resource managers and planners. Evapotranspiration (ET) is not only one of the key parameters but also one of the most difficult parameters of the hydrologic cycle to estimate. With the help of Remote Sensing and Geographic Information Systems (GIS), it is now possible to estimate ET accurately for large geographical areas. The main objective of this study was to design an ArcMap toolbar, called ET Calculator, in ArcGIS ModelBuilder to estimate ET from Landsat 8 imagery. This toolbar estimates actual ET from Landsat 8 imagery using the Surface Energy Balance Algorithms for Land (SEBAL) model. It is hoped that this tool could be quite useful for researchers who are interested in retrieval of ET.

Keywords: *ArcGIS, ModelBuilder, ET, NDVI, Emissivity, SEBAL.*

WATER YIELD AND QUALITY CONTROL IN BEECH FOREST, PAIRED WATERSHED STUDY IN YAYLACIK RESEARCH AREA (TURKEY

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Abstract

Nowadays, under the influence of climate change, the protection and development of water resources have gained importance. The ICPP published in 2007 foresaw that rainfall in the region around the Mediterranean (which is the region Turkey belongs to) could reach 5-40%. In this context, the positive contributions of forest ecosystems gain more importance in exploiting water resources. The research has identified the impacts on water yield and quality of forest ecosystems, which have a significant impact on water resources. The Yenice Forests, including the Yaylacık Research Forest where the research area is located is defined as one of the 100 hot spots defined by WWF for few forests in Europe because of its rich biological diversity and habitat diversity. For this reason, it is a region with high protection sensitivity at both national and international level. With 90% of the research forest being in the 1st and 2nd Bonitet class, it is one of the most productive forest areas of Turkey. The research area is the beech fields in the basin of Salavat in the Yaylacık Research Forest area. Approximately 93% of the forest areas in the basin form beech forests. Two beech paired basins have been selected as control and application basins with similar features in terms of slope, general view, elevation and vegetation characteristics. In selected basins water supply, flow characteristics and some chemical and physical water quality parameters have been measured. Calibration equation has been developed with the water yield values obtained from paired watersheds. At the same time, the linear relationship equations between the control and application basins have been determined for the water quality parameter values measured during the calibration period.

Keywords: *Water yield, paired watershed, climate change.*

CURRENT STATE OF FIR TAXA GENETIC RESOURCES CONSERVATION IN TURKEY

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Abstract

Fir species occupy 626.647 ha of forestland which constitutes approx. 3% of total forest areas in Turkey. The genus of *Abies* has five taxa naturally occurring in Turkey where three of them are endemic. These are *Abies cilicica* subsp. *cilicica*, *A. c.* subsp. *isaurica* Coode & Cullen (endemic), *A. nordmanniana* subsp. *equi-trojani* (endemic), *A. n.* subsp. *nordmanniana*, *A. n.* subsp. *bormülleriana* (endemic) and *A. n.* subsp. *olcayana* (endemic). They have significant ecological, economic and silvicultural functions in Turkey forest as pure and mixed stands. Improvement of in-situ and ex-situ conservation works by considering genetic studies will be beneficial for sustainable management of the species. All populations are genetically unique and peerless since they are adapted to their environments. In order to determine the genetic variation of the populations, the best way is to compare the populations in several environments. Species with wide distributions have also several geographic variations and local races. The purpose of the paper is to describe the current conservation state of fir species in Turkey and to suggest marginal, peripheral or isolated population as new gene conservation forest (GCF). Moreover it has given information data about conservation practices as tool for "gene conservation forest" and "seed stands (SS)". Currently, it has been selected 14 GCF (3 GCF of *A. n.* subsp. *bornmülleriana*, 3 GCF of *A. n.* subsp. *nordmanniana, 2* GCF of *A. n.* subsp. *equi-trojani, 4* GCF of *Abies cilicica* subsp. *cilicica*, 1 GCF of *A. c.* subsp. *isaurica* and 1 GCF of *A. n.* subsp. *olcayana*) and 25 SS (11 GCF of *A. n.* subsp. *nordmanniana,* 11 GCF of *A. n.* subsp. *bornmülleriana*, *1* GCF of *A. n.* subsp. *equi-trojani* and 2 GCF of *A. c.* subsp. *isaurica*). There are almost 5082.2 ha of in-situ conservation areas of fir taxa in Turkey.

Key words: *Abies, Genetic variation, Conservation, Marginal population, Turkey.*

DETERMINATION OF NITROGEN MINERALIZATION IN FOREST REHABILITATION AREAS (TWO YEAR RESULTS)

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Abstract

In this study was carried out to reveal the effects of nitrogen mineralization on degraded beech field with support of black alder. For this purpose, degraded beech forest area was selected in Arhavi, Artvin (Turkey). These area was prepared for beech planting, black alder planting, beech + black alder planting and control (non- plantation) fields after clear-cutting studies. Soil samples were taken from 24 sample plots in these areas. Nitrogen mineralization was determined by using micro distillation method with field incubation. Nitrogen mineralization period were conducted between November 2014 and October 2016. As a results of this period (24 months), it has been found that the total amount of mineralization in the beech planting area was 51.12 kg ha^{-1}, in black alder planting areas 52.60 kg ha^{-1}, beech + black alder areas 54.20 kg ha^{-1} and control areas 48.54 kg ha^{-1} at a depth of 10 cm . According to these results, total nitrogen mineralization amount in the planting areas was higher than in control areas. The amount of nitrogen mineralization in the soil at the end of the first year was found to be higher than that of the second year. For this reason, the amount of mineralized nitrogen in the soil is considered to be used by plants especially in the second year. The results obtained from this work will provide important contributions especially in the plantation of black alder trees.

Key words: *Nitrogen mineralization, beech, black alder, Artvin.*

SOCIO-ECONOMIC AND INSTITUTIONAL FACTORS DETERMINING WILLINGNESS TO PARTICIPATE IN CONSERVATION OF FOREST

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Abstract

Zimbabwe underwent a resettlement programme to address the imbalance in land access. It is hypothesised that the resettlement programme exacerbated deforestation in Zimbabwe. Research on resettlement focused mainly on gender, land tenure, productivity and livelihoods. Few research studies on issues concerning willingness and socio-economic and institutional factors which determine participation in conservation of forest in resettlement areas have been done hence a survey was conducted in Shamva, Zimbabwe. A sample of 247 respondents was randomly selected and stratified as 98 A1 farmers, 50 A2 farmers and 99 Old resettled farmers. The data was collected using structured questionnaire interviews and observation. Willingness to participate was analyzed using the Knowledge, Attitude and Practical (KAP) analytic framework and the socio economic and institutional factors were analyzed using the binary logistic regression analysis. The KAP analytic framework showed that all resettled farmers were willing to conserve forests with 86% for A2, 84% for A1 and lastly Old resettled farmers at 76.8%. Results of the binary regression model revealed that the significant factors which explain willingness to participate in forest conservation at 10% level of significance for the A1 resettlement model were secondary education (p -0.02), gender (p-0.011), paraffin (p-0.001), extension (0.011), Environmental Management Agency (0.001) and the Old resettlement scheme had marital status (0.015), culture (0.005), community leaders (0.006) and A2 had no significant factors at this level. Strategies to encourage conservation of trees on the three models should differ, but include rural electrification, education, use of renewable energy and creation of income generating projects.

Keywords: *deforestation, resettlement, household, willingness, Zimbabwe.*

PHENOTYPING TREES FOR TRAITS RELATED TO DROUGHT STRESS TOLERANCE – IMPORTANCE AND CHALLENGE

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Abstract

Results from green-house experiments on the early development of shoots and roots from hardwood cuttings of three different poplar genotypes and seedlings from oak (*Quercus petraea* and *Quercus robur*) will be presented. Already after an experimental time of 65 days (poplar hardwood cuttings) respectively 73 days (oak seedlings) in pots, the young plants showed a clone/ species specific growth performance. For all the species the plants were treated with two levels of irrigation (fully and reduced irrigation). For aboveground components traits of interest have been fresh and dry mass, number of shoots, length of shoots, number of leaves and leave area. For the belowground components root fresh and dry biomass, the total root length were analysed for each clone resp. each population. The results will highlight the effects of different irrigation treatments on the plant's growth performance which emerge already after just a few weeks from the beginning of the experiment. Based on our experimental design, it should be possible to develop a robust method for high throughput phenotyping of trees in an early developmental stage.

Keywords: *poplar, Quercus spec., pot experiment, early root/ shoot development.*

GREENPRENEURSHIP AT THE BASE OF THE PYRAMID: A SMALL SCALE COMMUNITY-BASED AFFORESTATION PROJECT IN INDONESIA

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Abstract

Approximately 41% of the Earth's land surface is covered by drylands that supports 36% of the world's human population. In Yogyakarta Province, Indonesia 53% of the province is covered by drylands in which the driest regency, Gunung Kidul that occupies nearly 47% of the province, is covered by 70% agricultural dryland. Despite the phenomena of forest degradation activities for agricultural developmet by large corporation, nearly abandoned agricultural drylands such as in Gunung Kidul Regency exists all over Indonesia. Such drylands have not attracted large investors nor government to develop into agricultural activities due to economic reasons. This research explored a community based afforestation project being carried out by the support of social investors and academic researchers, virtually without involvement of the government. Among other, teak is one of only few plantations that could grow in such dryland areas and being the core competency of local farmers. The basic arrangement between the investors and farmers was mudharabah revenue sharing as an alternative to conventional pay-in-cash to land owners and smallholder farmers. The economic benefits of the program were valued by using enterprise budget method by considering the capital investment and operating expenses in which cost inflation and teakwood prices increases were incorporated. This research proved that the community-based teakwood afforestation activities along with mudharabah revenue sharing in marginal drylands could fairly improve the wealth of all stakeholders in the program.

Keywords: *afforestation, dryland agriculture, enterprise budget, mudharabah, smallholder farmers.*

CORRELATION BETWEEN CLIMATE VARIABLES AND GROWTH OF PEDUNCULATE OAK (*QUERCUS ROBUR* L.)

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Abstract

Climate models predict higher annual mean temperatures and a change in precipitation patterns leading to wetter winters and drier, hotter summers in Europe. Tree-rings contain information regarding the climate conditions that have an influence on the growth of the trees. It is assumed that the dieback of oak forests in Europe is caused by climate changes acting over a long period of time. The expected impact of climate change on radial growth and tree-ring width in Serbia is already recorded in the studies of beech, oak and Norway spruce. Ten dead and ten living trees of pedunculate oak (*Quercus robur* L.) were sampled at the Branjevina Management Unit (Sombor Forest Division, Vojvodina šume Public Enterprise) in Serbia in 2013. Samples were processed with dendrochronological methods and statistically evaluated with *bootRes* package in R. Climate data was taken from CARPATCLIM database. This research studied the influence of two climate elements (temperature and precipitation) and SPI (Standardized Precipitation Index) on pedunculate oak radial growth. Standardized Precipitation Index was developed for defining and monitoring drought for long-term observations, therefore it is possible to analyze the phenomenon of drought for a given time period (month, season, year, etc.). Analysis of the correlation between ring-width indices of pedunculate oak and average monthly temperatures (1960-2010), total monthly precipitation (1960-2010) and SPI (3-36 months) showed significant values. Bootstrapped correlation between the growth of dead trees and SPI (16-26 months) from June to October was significant, hence they should be considered in the future understanding of the impact of drought on forests.

Key words*: tree-ring growth, dendrochronology, SPI Index, Pearson's correlation, drought.*

CHARACTERISTICS AND INITIAL EFFECTS OF THINNING IN A POPLAR PLANTATION OF THE PANNONIA CLONE

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Abstract

Research was performed in a plantation of the poplar clone Pannonia on alluvial soil of the Danube River, with a planting distance of 4.25×4.25 m. At the age of 10 years a field experiment was established comprising two experimental plots with moderate and heavy thinning and one control plot in three replications within a randomized block design, each area of 0.1 ha. The mean height grew to 26.2 m, and breast height diameters from 22 to 22.2 cm. On the experimental plots were recorded from 522 to 542 trees per hectare, i.e. the survival amounted from 94.1 to 97.7%, with a basal area of 19.9-20.7 $m^2 \cdot ha^{-1}$. On the experimental plots with moderate thinning an average of 130 trees per hectare (24.0%) were felled in total with the basal area of 3.61 $m^2 \cdot ha^{-1}$ (17.4%), and on the experimental plot with heavy thinning an average of 247 trees per hectare (47.3%) were felled with the basal area of 8.21 $m^2 \cdot ha^{-1}$ (41.2%). The diameters of all trees were measured after 11 years to determine the initial effects of thinning. The trees showed higher diameter increment by 4-11% and basal area by 11-21% on the thinned experimental plots compared to the control plot, but the differences were not significant. The growth of the basal area per hectare was highest in the control plot, 1.66 $m^2 \cdot ha^{-1} \cdot year^{-1}$, while in the experimental plot with moderate thinning it was 1.51 $m^2 \cdot ha^{-1} \cdot year^{-1}$, and the differences were not significant. The increment of the basal area per hectare was lowest in the experimental plot with heavy thinning, 1.06 $m^2 \cdot ha^{-1} \cdot year^{-1}$, and the differences were significant in relation to the control plot.

Key words: *Clone Pannonia, alluvium of the Danube River, thinning, diameter increment, basal area increment.*

CHARACTERISTICS OF THE INCREMENTS OF SPRUCE TREES IN THE PERIOD FROM 32 TO 50 YEARS AFTER THE APPLICATION OF TWO HEAVY SELECTIVE THINNINGS

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Abstract

The paper presents the characteristics of the increment of tree growth elements (height, diameter, basal area and volume) in the monoculture of the spruce (*Picea abies* Karst.) in the period of 33-40 and 41-50 years, after the application of heavy selective thinnings. In both periods, the trees with larger dimensions, i.e., breast height diameter, had greater increments of growth elements compared to the smaller trees. By grouping trees in the group of 200 trees per hectare sorted by their diameters showed that after the first thinning the 600 thickest trees per hectare had uniform increments of diameter at breast height, basal area and volume being significantly larger than the next group of thinner trees. In the period after the second thinning, the groups of the 200 thickest trees per hectare had significantly higher increments of diameter, basal area and volume in relation to the next groups of 201 to 600 thickest trees that had a uniform and significantly greater increments from the following groups of the thinner trees. The results indicate that in the studied spruce plantation only 600 thickest trees per hectare singled out according to the size of the increment in the period after the first thinning. In the period after the second thinning, only the 200 thickest trees were singled out according to the size of the increment in diameter at breast height, basal area and volume, which indicates to intensive differentiation of trees according to the increment potential under the influence of heavy selective thinning.

Key words: *Picea abies Karst., increment of growth elements, differentiation of trees, increment potential.*

MORPHOLOGICAL CHARACTERISTICS AND VARIABILITY OF THE SEEDLINGS OF THE SYCAMORE MAPLE (*ACER PSEUDOPLATANUS* L.)

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Abstract

The comparative morphometric analysis of 11 half-sib family of the sycamore maple showed variability of the seedlings within and between lines. The seed used for the analysis was collected from micro-populations on the territory of Belgrade (Serbia). The trial was established at the seedling nursery of the Institute of Forestry in Belgrade (Serbia). At the age of 30 days on a sample of 30 seedlings per the half-sib family following characteristics were measured: length of root as well as length of epicotyl, hypocotyl and cotyledon, cotyledon width, weight of seedling, root collar diameter and number of cotyledons. The obtained results contribute to acquiring knowledge on the analyzed characteristics, give a preliminary assessment of the genetic variability of the studied half-sib family and make a good basis for an adequate use of the genetic potential of the species.

Key words: *sycamore maple, seedling, half-sib family, variability.*

EVALUATION OF SOME RUNOFF AND PHYSICOCHEMICAL PARAMETERS IN AN ALCALINE STREAM OF SCOTS PINE FOREST

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Abstract

This study contains evaluating runoff and physicochemical parameters data from some different tributaries of Oltu stream and it has been provided by interpreting Pearson correlation analysis. The watersheds dominated by Scots pine (*Pinus sylvestris* L.) In the data set used in the study, runoff (Q), water temperature (WT), pH, electric conductivity (EC), sodium (Na^+), potassium (K^+), calcium(Ca^{2+}) and magnesium (Mg^{2+}), carbonate (CO_3^{2-}), bicarbonate(HCO_3^-), chloride (Cl^-), sulfate (SO_4^{2-}), sodium absorption factor (SAR), and boron (B) concentration results of measurements were present. Correlation analysis were explained to relations between hydrologic and physiochemical parameters. According to the results of the analysis, some strong negative relations between the runoff and some other parameters (electric conductivity, sodium, chloride, sulfate, sodium absorption factor, and boron concentration) were found. The runoff and salinity have been found as hydrochemical parameters working as the key consideration. The physicochemical characterization of Oltu stream might be strongly influenced by the soil-water interaction. Besides, the dilution effect was shown in Oltu stream which has characterized snowmelt-dominated stream.

Keywords: *Runoff and physicochemical parameters, Oltu stream, Dilution effect.*

ADAPTATION OF SOME TREE SPECIES TO URBAN ENVIRONMENT (PLOVDIV, BULGARIA)

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Abstract

During their ontogenetic development plants are subjected to constant impact of environmental factors, including atmospheric anthropogenic pollution. Exceeding values and continued influence oftoxic gases, aerosols and dust, negatively affect the status and functioning of living organisms. Green plant, as a complex integrated system operating on the principle of feedback and self-regulation, is particularly vulnerable to any extreme influence. Establishing the reaction specificity and the tolerance to air pollution of the widespread tree species are crucial for predicting the state of the green system in cities. As polluted air is a stress factor that contributes to the decline of urban trees we aimed to investigate the impact of anthropogenic activity on development and adaptation of four tree species (*Acer heldreichii, Tilia tomentosa, Fraxinus excelsior* and *Pinus nigra*). Seedlings were purchased from certified greenery and planted at four selected sites in Plovdiv (Bulgaria) during spring of 2015. Monthly observations were made on their development, leaf injuries appearance, photosynthetic pigment content and antioxidant enzymes activity. Height and stem diameter were measured at the end of vegetation period. Results from this two-year study revealed that the negative influence of the polluted environment occurs at an earlier stage in the photosynthetic process compared to leaf lesions appearance. Although an extension to the above work is necessary to find the moment and the mechanism of involving the antioxidant protection into adaptation processes of the studied tree species, it is clear that these biochemical compounds can be a very useful indicator of stress level.

Keywords: *air pollution, urban environment, green system, photosynthetic pigments, antioxidant enzymes.*

TWO SIDES OF THE GOLDEN JACKAL: ITS CONTROVERSIAL ROLE IN SOUTHWESTERN HUNGARY

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Abstract

The golden jackal was autochtonous in Hungary until the 1970s when it became extinct because of extensive hunting and habitat loss. During the 1990s, it appeared again in the southwestern part of the country. Initially, the species was invisible, because of its small population size and hiding lifestyle. Afterwards, the population began to expand and game managers mention the species as a pest, time and again. On the other hand, ecologists welcome jackals as a new element of ecosystem, which increases the biodiversity and improves the ecosystem services. In our study, we attempted to lighten different ecological aspects of this enigmatic species. In order to attain our objectives, we investigated the effect of jackals on the epidemiology of a micro- and a macroparasite. We hypothesized that the species, through improvement of ecosystem services, favour the trend in tuberculosis epidemic sustained by wild ungulates; on the other hand, as a canid, golden jackal could pose a risk of echinococcosis. Comparing the prevalence of suspect tuberculosis lesions on jackal habitats with adjacent sites, we found a significant difference (11.7% on jackal sites and 32.1% on adjacent area). On the other hand, prevalence of echinococcosis in golden jackal was 15.4%, while mean intensity was 288.83. Summarizing these results, we concluded that the presence of this carnivore is beneficial to the trend of tuberculosis endemic; not with standing, the species seemed to be a reservoir of *Echinococcus* spp. on areas, where its population gets dense. Our investigation highlighted the complex effect of a change in an ecosystem.

Keywords: *Golden jackal, tuberculosis, Echinococcus spp, One Health, biodiversity.*

ISSUES ASSOCIATED WITH THE EXISTENCE OF FICUS MICROCARPA IN COMPOUND FARMS AND BUSHES AT NNOBI, SOUTHEASTERN NIGERIA

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Abstract

Historically in southeastern Nigeria, smallholder farmers plant trees in compound farms for more than one purpose. *Ficus microcarpa*, a popular fodder plant was studied to elucidate the issues associated with its existence in compound farms at Nnobi in Anambra state, Southeastern Nigeria. Primary data generated from the survey of 45 small-ruminant farmers at the location were used to determine the origin, reasons for planting, agronomic characteristics, and the dynamics of its use as a fodder plant by the farmers. The proximate composition of its leaf meal was also determined. Majority of the trees (97.78%) were planted by either the grandparents (44.44%) or parents (28.89%) of the farmers, thus, 75.56% of the trees have existed for 31 – 51 years and above. The trees were planted exclusively for ruminant browsing (100.00%) and other purposes such as shed (64.44%) and medicine (24.44%) among others. The tree is propagated vegetatively (93.33%), and does not require much agronomic care. About 1 to 2 stands (68.89%) were found per household. They produced fodder mostly during the rainy season (86.66%), and were harvested as the occasion demanded. All the farmers fed the fodder to small ruminants, while 31.11% fed it to large ruminants. The fodder yielded mean crude protein content of 12.56±1.01%, ether extract (2.13±0.49%), crude fiber (26.30±3.19%) and total ash (13.85±0.98%) among other proximate contents. Further studies on the socioeconomic and phytochemical characteristics of *F. microcarpa* are needed in order to elucidate its other beneficial attributes that make it a browse plant of promise in Nigeria.

Keywords: *Browse, ficus, ruminants, compound bushes, small-holder farmers, Nigeria.*

THE SELENIUM CONTENT OF AMANITA SPECIES FROM SAMANLI MOUNTAIN OF MARMARA REGION (TURKEY)

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Abstract

Selenium contents were analysed in some wild *Amanita* taxa (*A. caesarea* (Scop.) Pers., *A. excelsa* (Fr.) Bertill., *A. franchetii* (Boud.) Fayod, *A. gemmata* (Fr.) Bertill., *A. mairei* Foley, *A. muscaria* (L.) Lam., *A. pantherina* (DC.) Krombh., *A. phalloides* (Fr.) Link, *A. rubescens* Pers., *A. vaginata* (Bull.) Lam. and *A. verna* (Bull.) Lam.) from Marmara region of Turkey by ICP-AES equipment. The widespread forest vegetation types of research area are *Fagus orientalis*, *Carpinus betulus*, *Castanea sativa*, *Abies nordmanniana* susbp. *bornmulleriana*, *Pinus sylvestris*, *Pinus maritima* (cultivated) and *Quercu*s sp. communities. Selenium uptake levels were observed at different amounts in *Amanita* species. Selenium levels were determined as 0.1-1.10 mg.kg^{-1} (*A. citrina*), 0.1-2.20 mg.kg^{-1} (*A. gemmata*), 0.10-3.80 mg.kg^{-1} (*A. muscaria*), 0.30-3.80 mg.kg^{-1} (*A. excelsa*), 0.20-11.50 mg.kg^{-1} (*A. rubescens*), 1.10-2.70 mg.kg^{-1} (*A. caesarea*), 1.60-4.40 mg.kg^{-1} (*A. mairei*), 0.30-0.90 mg.kg^{-1} (*A. phalloides*), 0.70-2.50 mg.kg^{-1} (*A. vaginata*), 0.20 mg.kg^{-1} (*A. pantherina*), 3.70 mg.kg^{-1} (*A. franchetii*) and 3.20 mg.kg^{-1} (*A. verna*). The highest Se concentration was determined as 11.5 mg.kg^{-1} in *A. rubescens*. In order to demonstrate possible spatial variations in Se composition of *Amanita* species multivariate analysis [cluster (CA)] was done.

Keywords: *Se, Amanita, Mushroom, Turkey.*

APIARY INTERACTIONS WITH FRUIT CULTIVARS IN COMPARATIVE AGRO-ECOLOGICAL CONDITIONS BETWEEN THE UNITED STATES AND BOSNIA HERZEGOVINA

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Abstract

Cultivar selection for climate resiliency influences successful fruit growing. Pollinator plant interactions further ensure the full maturation of the fruit. While written records of fruit cultivation and apiary husbandry in Bosnia and Herzegovina date back to the 16th century, much earlier than that of Florida, certain parallels can be drawn. This probative study evaluates collections of viable autochthonous and newly introduced fruit cultivars in the two regions. An overlay of USDA plant hardiness zones will be combined with the Köppen CCS. Additional comparative data will be garnered from open source R programs, *vegan* and *bipartite* (pollinator-plant interactions), processing a multivariate ordination of biological communities assisting our analyses of species–environment relationships correlating the classification of these two geographical communities. Surveys of 42 commercial and homestead orchards in Florida provide the data for viability, while noting managed or feral apiary interactions. Results show that even small-scale orchard operations have notable agro-tourism and agro-forestry economic impacts, thus preserving feral bees, autochthonous fruit specimens, disease resistant genetic diversity, and long-term sustainability. Data from guild planting and permaculture principles are included in the samples, as are staple companion plantings of the Moraceae family, potentially relevant for not only Bosnia and Herzegovina, but also subtropical zones, generally. In order to sustain agro-ecological conditions conducive to agro-tourism, efforts should be directed towards providing fruit growers with climatically resilient, durable, biologically diverse apiaries that facilitate the expansion of viable cultivars in the Mostar to Trebinje region while considering environmental and economic impacts of food based tourism.

Keywords: *Apiary science, tropical fruit cultivars, agro-forestry, climate resilience, landscape architecture.*

THE EFFECT OF CONTROLLED-RELEASE FERTILIZER OSMOCOTE ON GROWTH OF SERVICE TREE (SORBUS DOMESTICA L.) SEEDLINGS

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Abstract

This study was conducted to compare the morphometric parameters of service tree seedlings treated with controlled release fertilizer Osmocote® Exact Standard 5-6 M and untreated plants, and to show the impact of fertilizer on the growth of service tree (*Sorbus domestica* L.) one-year-old seedlings. This study was carried out and repeated the experiment field of the Institute of Forestry in Belgrade during the growing seasons in 2011, 2012 and 2013. Osmocote dose, which was used for the purpose of the study, was 4 $kg \cdot m^{-3}$ of the substrate. The results showed that the seedlings, which were treated with fertilizer, had statistic significant larger collar diameter and height growth in comparison with untreated, control seedlings. The treated seedlings height was 1.69-1.9 times higher then the height of untreated seedlings, and collar diameter 1.25-1.27 times.

Key words: *service tree (Sorbus domestica L.), seedlings, fertilizer Osmocote® Exact Standard 5-6 M, collar diameter, height.*

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