

## Estimated Biogenic VOC Emission Rates for Common U.S. Trees and Shrubs

Genus <sup>a</sup>	Common name	Isoprene		Monoterpenes	
		Emission rate	Reliability <sup>b</sup>	Emission rate	Reliability <sup>b</sup>
<i>Eucalyptus</i>	Eucalyptus	70.0	Genus	3.0	Genus
<i>Liquidambar</i>	Sweetgum	70.0	Genus	3.0	Genus
<i>Nyssa</i>	Black gum	70.0	Genus	0.6	Genus
<i>Quercus</i>	Oak	70.0	Genus	0.2	Genus
<i>Robinia</i>	Black locust	70.0	Genus	0.2	Genus
<i>Casuarina</i>	Beefwood	70.0	Genus	0.1	Genus
<i>Platanus</i>	Sycamore	70.0	Genus	0.1	Genus
<i>Populus</i>	Poplar	70.0	Genus	0.1	Genus
<i>Salix</i>	Willow	70.0	Genus	0.1	Genus
<i>Cupaniopsis</i>	Carrotwood	44.9	Genus	0.0	Genus
<i>Koelreuteria</i>	Goldenrain tree	44.9	Family	0.0	Family
<i>Cercidiphyllum</i>	Katsura tree	39.4	Order	1.6	Order
<i>Rhamnus</i>	Buckthorn	36.9	Genus	0.0	Genus
<i>Serenoa</i>	Saw palmetto	35.0	Genus	0.1	Genus
<i>Myrtus</i>	Myrtle	30.0	Genus	0.0	Genus
<i>Ficus</i>	Fig	22.9	Genus	0.2	Family
<i>Berberis</i>	Barberry	22.2	Family	0.0	Family
<i>Mahonia</i>	Mahonia	22.2	Family	0.0	Family
<i>Nandina</i>	Heavenly bamboo	22.2	Genus	0.0	Genus
<i>Melaleuca</i>	Melaleuca lilac	22.1	Family	0.0	Family
<i>Syzygium</i>	Jambolan plum	22.1	Family	0.0	Family
<i>Hamamelis</i>	Witch-hazel	17.7	Genus	3.0	Family
<i>Eucommia</i>	Hardy rubber tree	19.7	Superorder	0.8	Superorder
<i>Picea</i>	Spruce	14.0	Genus	3.0	Genus
<i>Callistemon</i>	Bottlebrush	14.1	Genus	0.0	Genus
<i>Sabal</i>	Cabbage palmetto	14.0	Genus	0.1	Genus
<i>Phoenix</i>	Date palm	13.9	Genus	0.0	Genus
<i>Maclura</i>	Osage-orange	11.5	Family	0.2	Family
<i>Eugenia</i>	Eugenia	10.2	Genus	0.0	Genus
<i>Pistacia</i>	Pistache	0.0	Genus	7.9	Genus
<i>Cotinus</i>	Smoketree	0.0	Family	3.4	Family
<i>Schinus</i>	California peppertree	0.0	Genus	3.4	Genus
<i>Abies</i>	Fir	0.1	Genus	3.0	Genus
<i>Acacia</i>	Acacia	0.1	Genus	3.0	Genus
<i>Cryptomeria</i>	Japanese cedar	0.1	Family	3.0	Family
<i>Juglans</i>	Walnut	0.1	Genus	3.0	Genus
<i>Magnolia</i>	Magnolia	0.1	Genus	3.0	Genus
<i>Metasequoia</i>	Dawn redwood	0.1	Family	3.0	Family
<i>Pinus</i>	Pine	0.1	Genus	3.0	Genus
<i>Sequoia</i>	Coast redwood	0.1	Family	3.0	Family
<i>Sequoiadendron</i>	Giant sequoia	0.1	Family	3.0	Family
<i>Taxodium</i>	Baldcypress	0.1	Genus	3.0	Genus
<i>Ginkgo</i>	Ginkgo	0.0	Genus	2.7	Genus

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<i>Larix</i>	Larch	0.1	Family	2.3	Family
<i>Ceanothus</i>	Ceanothus	0.0	Genus	2.1	Genus
<i>Acer</i>	Maple	0.1	Genus	1.6	Genus
<i>Aesculus</i>	Buckeye	0.1	Order	1.6	Order
<i>Ailanthus</i>	Tree of heaven	0.1	Order	1.6	Order
<i>Asimina</i>	Pawpaw	0.1	Order	1.6	Order
<i>Carpinus</i>	Hornbeam	0.1	Genus	1.6	Genus
<i>Carya</i>	Hickory	0.1	Genus	1.6	Genus
<i>Cedrus</i>	Cedar	0.1	Genus	1.6	Genus
<i>Citrus</i>	Citrus	0.1	Genus	1.6	Genus
<i>Cornus</i>	Dogwood	0.1	Genus	1.6	Genus
<i>Pseudotsuga</i>	Douglas-fir	0.1	Genus	1.6	Genus
<i>Araucaria</i>	Bunya bunya	0.1	Order	1.5	Order
<i>Taxus</i>	Yew	0.1	Superorder	1.5	Superorder
<i>Alnus</i>	Alder	0.1	Family	0.9	Family
<i>Corylus</i>	Hazelnut	0.1	Family	0.9	Family
<i>Myrica</i>	Bayberry	0.0	Genus	1.0	Genus
<i>Ostrya</i>	Hophornbeam	0.1	Family	0.9	Family
<i>Cupressus</i>	Cypress	0.0	Genus	0.8	Genus
<i>Calocedrus</i>	Incense cedar	0.1	Family	0.6	Family
<i>Cupressocyparis</i>	Leyland cypress	0.1	Family	0.6	Family
<i>Fagus</i>	Beech	0.1	Genus	0.6	Genus
<i>Juniperus</i>	Juniper	0.1	Genus	0.6	Genus
<i>Oxydendrum</i>	Sourwood	0.1	Genus	0.6	Genus
<i>Persea</i>	Red bay	0.1	Genus	0.6	Genus
<i>Thuja</i>	Cedar	0.1	Genus	0.6	Genus
<i>Castanea</i>	Chestnut	0.1	Family	0.4	Family
<i>Lithocarpus</i>	Tanbark oak	0.0	Genus	0.4	Family
<i>Aralia</i>	Devil-walkingstick	0.1	Superorder	0.2	Superorder
<i>Betula</i>	Birch	0.1	Genus	0.2	Genus
<i>Buxus</i>	Boxwood	0.1	Superorder	0.2	Superorder
<i>Celastrus</i>	Bittersweet	0.1	Order	0.2	Order
<i>Celtis</i>	Hackberry	0.1	Genus	0.2	Genus
<i>Cercidium</i>	Paloverde	0.1	Family	0.2	Family
<i>Chamaecyparis</i>	False cypress	0.1	Genus	0.2	Genus
<i>Cladrastis</i>	Yellowwood	0.1	Family	0.2	Family
<i>Delonix</i>	Royal poinciana	0.1	Family	0.2	Family
<i>Elaeagnus</i>	Russian olive	0.1	Superorder	0.2	Superorder
<i>Euonymus</i>	Euonymus	0.1	Order	0.2	Order
<i>Gleditsia</i>	Honeylocust	0.1	Family	0.2	Family
<i>Grevillea</i>	Grevillea	0.1	Superorder	0.2	Superorder
<i>Gymnocladus</i>	Kentucky coffeetree	0.1	Family	0.2	Family
<i>Ilex</i>	Holly	0.1	Genus	0.2	Genus
<i>Laburnum</i>	Golden-chain tree	0.1	Family	0.2	Family
<i>Liriodendron</i>	Tuliptree	0.1	Genus	0.2	Genus

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<i>Morus</i>	Mulberry	0.1	Genus	0.2	Genus
<i>Olea</i>	Olive	0.0	Genus	0.3	Genus
<i>Sophora</i>	Japanese pagoda tree	0.1	Family	0.2	Family
<i>Tsuga</i>	Hemlock	0.1	Genus	0.2	Genus
<i>Wisteria</i>	Wistaria	0.1	Family	0.2	Family
<i>Zelkova</i>	Japanese zelkova	0.1	Family	0.2	Family
<i>Arbutus</i>	Madrona	0.1	Family	0.1	Family
<i>Cercis</i>	Eastern redbud	0.1	Genus	0.1	Genus
<i>Diospyros</i>	Persimmon	0.1	Genus	0.1	Genus
<i>Fraxinus</i>	Ash	0.1	Genus	0.1	Genus
<i>Iva</i>	Marshelder	0.1	Hardwood	0.1	Hardwood
<i>Laurus</i>	Laurel	0.1	Family	0.1	Family
<i>Lindera</i>	Spicebush	0.1	Family	0.1	Family
<i>Melia</i>	Chinaberry	0.1	Genus	0.1	Genus
<i>Pieris</i>	Pieris	0.1	Family	0.1	Family
<i>Polygonum</i>	Japanese Knotweed	0.1	Hardwood	0.1	Hardwood
<i>Prunus</i>	Plum/cherry	0.1	Genus	0.1	Genus
<i>Rhododendron</i>	Rhododendron	0.1	Family	0.1	Family
<i>Sassafras</i>	Sassafras	0.1	Genus	0.1	Genus
<i>Ulmus</i>	Elm	0.1	Genus	0.1	Genus
<i>Umbellularia</i>	California laurel	0.1	Family	0.1	Family
<i>Vaccinium</i>	Blueberry	0.1	Genus	0.1	Genus
<i>Adenostoma</i>	Chamise	0.0	Genus	0.1	Genus
<i>Forsythia</i>	Forsythia	0.0	Family	0.1	Family
<i>Syringa</i>	Lilac	0.0	Family	0.1	Family
<i>Vinca</i>	Myrtle/periwinkle	0.0	Order	0.1	Order
<i>Amelanchier</i>	Serviceberry	0.0	Family	0.0	Family
<i>Arctostaphylos</i>	Manzanita	0.0	Genus	0.0	Genus
<i>Camellia</i>	Camellia	0.0	Genus	0.0	Genus
<i>Catalpa</i>	Catalpa	0.0	Family	0.0	Family
<i>Cercocarpus</i>	Mountain mahogany	0.0	Genus	0.0	Genus
<i>Cinnamomum</i>	Camphor	0.0	Genus	0.0	Genus
<i>Cotoneaster</i>	Cotoneaster	0.0	Genus	0.0	Genus
<i>Crataegus</i>	Hawthorn	0.0	Family	0.0	Family
<i>Heteromeles</i>	Christmasberry	0.0	Family	0.0	Family
<i>Hibiscus</i>	Rose-of-sharon	0.0	Genus	0.0	Genus
<i>Hydrangea</i>	Hydrangea	0.0	Order	0.0	Order
<i>Jacaranda</i>	Jacaranda	0.0	Genus	0.0	Genus
<i>Lagerstroemia</i>	Crapemyrtle	0.0	Genus	0.0	Genus
<i>Ligustrum</i>	Privet	0.0	Genus	0.0	Genus
<i>Lonicera</i>	Honeysuckle	0.0	Family	0.0	Family
<i>Malus</i>	Apple	0.0	Family	0.0	Family
<i>Paulownia</i>	Royal paulownia	0.0	Order	0.0	Order
<i>Parthenocissus</i>	Virginia creeper	0.0	Family	0.0	Family
<i>Philadelphus</i>	Mock-orange	0.0	Order	0.0	Order

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<i>Pittosporum</i>	Tobira	0.0	Genus	0.0	Genus
<i>Podocarpus</i>	Fern pine	0.0	Genus	0.0	Genus
<i>Pyracantha</i>	Pyracantha	0.0	Family	0.0	Family
<i>Pyrus</i>	Pear	0.0	Genus	0.0	Genus
<i>Raphiolepis</i>	India hawthorn	0.0	Genus	0.0	Genus
<i>Rhus</i>	Sumac	0.0	Genus	0.0	Genus
<i>Ribes</i>	Currant	0.0	Order	0.0	Order
<i>Rosa</i>	Rose	0.0	Genus	0.0	Genus
<i>Rubus</i>	Bramble	0.0	Family	0.0	Family
<i>Sambucus</i>	Elder	0.0	Genus	0.0	Genus
<i>Sorbus</i>	Mountain-ash	0.0	Family	0.0	Family
<i>Tecomaria</i>	Cape honeysuckle	0.0	Genus	0.0	Genus
<i>Tilia</i>	Basswood	0.0	Order	0.0	Order
<i>Toxicodendron</i>	Poison ivy	0.0	Genus	0.0	Genus
<i>Viburnum</i>	Viburnum	0.0	Genus	0.0	Genus
<i>Vitis</i>	Grape	0.0	Genus	0.0	Genus

<sup>a</sup>OVOC emission rate for all genera = 1.67. OVOC based on total emissions (Guenther et al. 1998) of reactive VOC (ethene, propene, butene, acetalehyde, formaldehyde, acetic acid, formic acid) and less reactive VOC (methanol, ethanol, acetone, ethane).

<sup>b</sup>Genus: measured genera values from the literature: C.D. Geron, pers. commun. (1999), Geron et al. (1994), Benjamin et al., (1996), Winer et al., (1983), Cronn and Nutmagul (1982), Evans et al., (1982), Rasmussen and Jones (1973); Family: median of genera values within family; Order: median of family values within order; Superorder: median of order values within superorder; Hardwood: median of hardwood values.

Note: Emission rates are in micrograms of C/g of leaf dry weight/hr (standardized to 1,000  $\mu\text{mol m}^{-2} \text{s}^{-1}$  of photosynthetically active radiation and 30°C).

From:

Nowak, David J.; Crane, Daniel E.; Stevens, Jack C.; Ibarra, Myriam. 2002. Brooklyn's urban forest. Gen. Tech. Rep. NE-290. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station. 107 p.