

Guaiacum officinale

Family: Zygophyllaceae



Peeling bark and mottling trunk

Common Names: Lignum-vitae; tree of life; bois de vie; guaiacum; guayaco; ironwood; palo santo

Synonyms (Discarded names): None found

Origin: Caribbean; Colombia; Guyana; Panama; Suriname; Venezuela

U.S.D.A. Zone: 10b-12 (34°F Minimum)

Growth Rate: Slow

Plant Type: Tree

Leaf Persistence: Evergreen

Flowering Months: Mostly anytime from Feb. to May

Light Requirements: Full to partial sun

Salt Tolerance: High

Drought Tolerance: High

Wind Tolerance: High

Soil Requirements: Wide range

Nutritional Requirements: Low

Major Potential Pests: Ganoderma

Typical Dimensions: 30' x 30'

Propagation: Seed

Human Hazards: None

Uses: Flowering tree; shade tree; specimen; hedge; roadways; seaside; patio; container



Umbrella-like canopy

Treasure Beach, Jamaica, Late January



Flower having 10 blue filaments and 10 yellow anthers

Natural Geographic Distribution

The tree's native range extends from throughout the Caribbean and from Panama to Guyana in Northern South America. It is a tree normally associated with the drier leeward sides of many Caribbean islands. These areas are often laden with thin soils and limestone outcroppings. The tree is however not confined to marginal areas and will prosper in well-drained deep soils and tropical forests.

Growth Habit

Lignum-vitae is a slow-growing evergreen tree that has a dense crown packed with many small dark green leaflets. If left unencumbered, the crown develops an umbrella-like shape that hides its many strong branches. It is often encountered as a relatively low-branching species. The branching of its trunks may be close to ground level or well above 10 feet tall. The branches are often crooked and the twigs have many wide-angled forks. However contrary to many accounts, I have not noticed any twisting of the trunks on the numerous trees that I have encountered.

Often described as a small tree, lignum-vitae can reach large proportions even in dry habitats. The species can grow more than 40 feet tall with an equally spreading crown and a trunk circumference of 3 feet or more. The bark peels away from its aging wood; first from the trunk and then from other younger wood. Thus, a portion of the tree always has exfoliating bark. The exposed wood is a mottle of red, green, gray, light brown and silver and is a significant ornamental feature of the older trees.

The species is very long lived, up to 1,000 years by some reports. The wood is considered the heaviest and densest of trees. It was used in commercial ship building for centuries. It is the only wood with a specific gravity of 1.09, enabling it to sink in salt water. It resists rot caused by insects and moisture so effectively that remains of lignum-vitae wood used as posts for dwellings by Taino Indians discovered in Tutu, St. Thomas, U.S. Virgin Islands, were dated by carbon dating and found to be over 800 years old.



Fledgling sapling and cactus among the limestone rock



Limestone outcrop and the trunk of a lignum-vitae in the background



Two young trees with divided trunks next to limestone outcrop



Kingston 2, Jamaica

Late May



Treasure Beach, Jamaica

Late January



This tree along a country road was about 60 feet tall and with a greater spread Treasure Beach, Jamaica, late May



Left: An old specimen with a seemingly healthy trunk **Right:** The opposite side revealed a significantly missing portion. Nevertheless, the crown of the tree, not seen, appeared in reasonably good condition



Jennifer Hecker

Admiration of the trunk of a 500 year old lignum-vitae
Puerto Rico



Mottled pattern of trunk Bridgetown, Barbados



Mottled pattern of trunk

St. Thomas, U.S. Virgin Islands



A bicameral low-branching trunk with a combined circumference of over 10 feet. This is the trunk of the same tree pictured at the top of page 4.



The tree can produce large numbers of crooked branches

Leaves, Flowers and Fruits

The leaves of the lignum-vitae are arranged opposite or sub-opposite on the stem. They are compound even-paripinnate leaves about 3-4 inches long. They have mostly 4 and sometimes 6 stalkless leaflets. The leaflets are entire with an oval shape, and sometimes blunt-pointed at both base and apex. They are generally 3/4 to 2 inches long and 1/2 to 1 1/4 inch wide. The leaf venation is pinnate. The leaf has a leathery texture and is glossy and dark green. The leaves do not change color throughout the year.



Two opposite even-pinnate leaves each having 4 leaflets



The youngest emerging leaves are light green

The flowers may appear at anytime of the year but are showiest from February through May. They gather together on the tree in large numbers so that while individually diminutive, together the tree is spectacular when in full bloom. The flowers are solitary or are produced in a few-flowered clusters. They are on slender minutely hairy pedicels 0.3 to 1 inch long. The flower has 5 spreading deep blue to purple petals that fade to white. They are nearly 0.75 inches wide and narrowed at the base and rounded at the apex. There are 10 stamens about 0.3 inches long with blue filaments and yellow anthers. The flowers have a subtle fragrance. In Jamaica, lignum-vitae blooms are at their peak mostly in February and March but can have flowers at other times. In Bermuda peak flowering is in July. In Barbados, it flowers twice a year.



Claremont Park, Jamaica

Late January



Flower with long pedicel shares a node with a leaf



An early to flower tree with a high branching trunk and was more than 40 feet tall
Claremont Park, Jamaica

Late January



In fading light, a close-up of a portion of the canopy of the tree above with newly formed flowers

The fruit are produced in almost the same abundance as the flowers. After changing color from green to orange at maturity, they are almost as ornamental as the blue flowers they preceded. They are produced on the same long stalks (pedicels) that once held the flowers. The fruit are flattish, somewhat heart-shaped, 2-chambered capsules. They are about 0.75 inches in diameter. Each fruit splits open along four seams to reveal two black seeds covered by a red fleshy seed covering called a sarcotesta. The fruit can take up to two months to mature.



A display of leaves, flowers, and fruits assembled in Jamaica in late June



Fruit capsule

Late June



Treasure Beach, Jamaica

Late June

Planting and Maintenance Guidelines

The tree is propagated from seeds. The seeds have a very short viable life and cannot be dried well. The tree is very adaptable to a wide variety of soils. It requires water when establishing or during extended drought periods. It is best to prune the tree to develop its structure so it remains strong and very resistant to breakage.

Pests

The lignum-vitae is generally free of insect and disease pests due to its dense wood composition. On occasion, Ganoderma may be a serious problem. Also called varnish fungus rot, the fungus attacks trees by disrupting vascular tissues and compromising the integrity of the structural root system. There is no cure or treatment once the tree is infected. The tree initially looks healthy, but months later branches die back and red-orange fruiting bodies or conches appear on the trunk of the tree or from cracks in the tree crotches. Sterilization of pruning tools is strongly recommended in areas where the disease is confirmed.



Death of a tree by the Ganoderma fungus.
Treasure Beach, Jamaica



The trunk of a Ganoderma affected tree on the left and an apparently healthy tree on the right.



A closer look at the Ganoderma conch

The Future of the Species

The flower of lignum-vitae is the national flower of the Bahamas. It is the national tree of Jamaica, where it has been revered but not vigorously protected. Once plentiful throughout much of the Caribbean, the species was overexploited for its valuable wood and medicinal products. International trade of lignum-vitae is restricted because of its placement in [CITES](#). The frequent reference to this tree as short in height is testament to fading memories of once large trees that use to populate its native range. Today the tree suffers from insufficient local protections and is still been removed unwontedly in many parts of its original range.

Comparison of *G. officinale* and *G. sanctum*

Guaiacum includes approximately 6 species of shrubs and trees from tropical America. *G. sanctum*, also called lignum-vitae, is native to very South Florida, the Bahamas, Cuba, Hispaniola, Puerto Rico, and from Yucatan, Mexico, south to Costa Rica. *G. sanctum* is more common in South Florida than *G. officinale* and it can be easily confused for *G. officinale*. *G. officinale* is a faster growing tree than the Florida native. *G. sanctum* is distinguished from *G. officinale* by usually having more (6-10) leaflets per leaf, shorter leaflets with longer internodes. The latter may account for the species having a less dense canopy than *G. sanctum*. The petals are clawed, having a narrow base, and sometimes slightly twisted, unlike those of *G. officinale*. The capsules frequently having more seeds 4 instead of 2 as is the case of *G. officinale*. Personal observations indicate that the trunks of *G. sanctum* have less mottling than its relative. Lignum-Vitae Key in the Florida Keys is a sanctuary for *G. sanctum*.



G. sanctum, shown here, has more leaflets per leaf than *G. officinale*



Rick Joyce

The clawed and slightly twisted petals of *G. sanctum* Exuma, Bahamas



Immature capsules of *G. sanctum*



G. sanctum typically produces 4 seeds per capsules which are at first covered by red sarcolemma.

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Fact Sheets

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YouTubes

[Red Silk-Cotton](#)
[Florida Landscape YouTube Channel](#)

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Native Tree Sheet:

Lignum Vitae

Guaiacum officinale

Caltrop Family (ZYGOPHYLLACEAE)

By Brian Daley and Thomas W. Zimmerman, Ph.D.
UVI-AES Biotechnology & Agroforestry



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Common Names

Lignum vitae (Virgin Islands), guayacán (Puerto Rico), palo santo (Cuba), bois saint (Haiti).

Description

A small, multi-stemmed, evergreen tree reaching up to 30 feet in high. Canopy is dense, spreading and rounded with dark green foliage. Trunk divisions begin low on the trunk, resulting in many strong branches. The trunk is covered in a dark brown, smooth bark which peels off in large, thin scales, exposing patches of gray and light brown. Compound leaves are olive green, thick, waxy and have rounded leaflets. The 5-petaled flowers have a subtle fragrance and the color varies in shades of blue to purple and occasionally white. Fruits are flattened, heart-shaped, two chambered capsules containing one or two seeds. The black seeds pushed from the fruit when ripe (dehiscence) and are covered with a bright red, fleshy coating called an aril.

Distribution and Ecology

The tree's native range extends from the Bahamas, through the



Figure 2. *Lignum vitae* leaves, flowers and fruit (Illustration from Vozzo).



Figure 1. An adult tree in full bloom. Inset: The copious blue and purple blooms are an uncommon color for tropical plants.

Greater and Lesser Antilles to Aruba. On the mainland it is native from Panama to Venezuela below 1,000 feet and planted as an ornamental from Florida to Trinidad and Tobago and elsewhere in the tropics. In the Virgin Islands it is found primarily on the drier east ends of all three islands and is most abundant on St. Croix where it is regenerating naturally.

Flowering and Fruiting

Flowering lasts for over a month and occurs throughout the year with a peak from March to May in the Virgin Islands. However, flowering is somewhat irregular as not all trees in a stand will flower at the same time and individual trees may bear flowers on only a portion of the canopy. As a result, there is often a lesser flowering period in January and February. The fruit can take 2 months to mature, with peak production from July to September with a lesser number maturing in March and April.

Seed Collection and Processing

Mature seeds can be collected directly from the tree when they are pushed out of the orange fruit. Large quantities of viable seeds are more easily obtained underneath mature trees, but must be collected shortly after they fall, as they begin to lose viability after only one



Figure 3. Mature seeds covered by a fleshy, red aril emerge from ripe fruit.

month. Manually extracting seeds from mature fruit is tedious and time consuming and should be avoided. All seeds should have the fleshy red aril removed, leaving only the cleaned, dry, semi-porous, black seed. The coating is easily removed by soaking the seeds in water for 10 minutes and agitating them. There is an average of 1,460 seeds per pound (3,200/kg).

Seed Treatments and Germination

Start germination in deep trays with a single layer of seeds because they are relatively small and germination rates can be relatively low if seeds are not treated. Germination trials at UVI indicate that germination begins in 15 to 20 days and is rather uniform, concluding in 5 weeks. Without any treatment 30% of seeds will germinate. Soaking them in water for 24 hours increases the rate to 50%. Seeds treated for one hour in a 2,000 ppm concentration of Gibberellic acid will germinate with over 75% success. Rapid, even germination at high rates make this species well suited to commercial production by local nurseries.

Greenhouse Management

Seedlings should be transplanted into pots after they have formed their second or third true leaf. Seedlings should also be transplanted before the young roots touch the bottom of the tray and become deformed, about two weeks after germination. As a general rule, the roots grow to double the length of the plant height. After one month, seedlings should be gradually acclimated to partial sun outside of the greenhouse/shadehouse. Care should be taken that the tap root does not grow out of the pot and into the ground. Seedlings reach 30 inches in 12 to 14 months.

Outplanting and Growth

Seedlings are very hardy and drought tolerant. They transplant into the field with a high success rate once they reach 25-30 inches (60-75 cm). Supplemental water is only required during initial establishment



Figure 4. The cleaned black seed and early development stages of lignum vitae seedlings.

and periods of prolonged drought. Lignum vitae plants in a UVI-AES establishment study averaged 1 foot (30 cm) of growth per year. After 30 months, trees averaged 32 inches (80 cm) of new growth, and began to produce flowers and fruit.

Landscape Uses

Lignum vitae is an attractive tree, with dense dark green foliage, abundant blue blooms and attractive fruit. It is well suited for planting in house lots, under power lines and even as a large hedge. The plant will tolerate shade but prefers full sun. One must consider that these trees will continue to grow over a period of 100 to 150 years, eventually reaching 30 feet in height.

Traditional Uses

The wood of lignum vitae is extremely dense and rich in natural oils. It is so heavy it sinks in fresh water. Before the advent of synthetic materials the wood was highly sought after because it is very resistant to decay in salt water and was the only tree that could be used for ship propeller drives. Today the highly prized, two toned wood is still used for carvings.

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Additional Reading

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