Guaiacum officinale L.

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ZYGOPHYLLACEAE (CALTROP FAMILY)

No synonyms

Bois de gaoac, bois saint, common lignumvitae, gaïac, gaïac franc, gaïc mâle, guayacán, guayacán colombiano, guayacán de playa, guayacán negro, guayaco, lignumvitae, palo santo, pau santo, pokhout, wayacá (Little and Wadsworth 1964)

The native range of *Guaiacum officinale* includes the South Caicos in the Bahamas, the Greater Antilles, most of the Lesser Antilles, coastal areas of Venezuela and Colombia, and Panama. The species is also native to Aruba, Bonaire, Curacao, and Tobago. Although present in Trinidad and Guyana, it may not be native there. However, because of development, harvest, and fires, *G. officinale* is extinct or near extinction on several Caribbean islands. The tree is planted as an ornamental in Bermuda, Florida, and other tropical areas (Francis 1993).

Guaiacum officinale is a slow-growing, small to medium-sized tree that reaches 3 to 10 m in height. Very old trees nearly 1 m d.b.h. have been reported (Francis 1993). The trunk, which is short and seldom straight, is covered with a smooth, mottled, gray-green bark and topped with a dense crown of dark green leaves. The tree is very hardy in dry and medium-rainfall sites, especially in coastal areas. Rocky limestone areas with 635 to 1570 mm of annual rainfall with a dry season of 2 months or more usually give the best results. If given protection from competing trees, the species will grow more rapidly in deep, rich, medium-textured soils. *Guaiacum officinale* grows from near sea level to 300 or 400 m in elevation (Francis 1993).

Guaiacum officinale sometimes grows in association with a sister species, *G. sanctum* L., but is not known to hybridize with it.

The wood of *G. officinale* is tough, hard, self lubricating, and resistant to sea water. It has a density of 1.20 to 1.36 g per cm^3 air-dried (Longwood 1962) and 1.05 g per cm^3 oven-dried (Chudnoff 1984). The wood was used historically for bushings, bearings, and pulleys for steam and sailing ships; today, it is principally used for carving, cutting boards, mortars, pestles, and charcoal. It has also been used to make a dye. Extracts of this wood have been used for hundreds of years in herbal medicine, although they are dangerous in large doses. For its beautiful flowers, fruits, and foliage, the species is widely planted as an ornamental, especially in the Caribbean area.

Flowering lasts for about 1 month and may occur from early spring to fall in Puerto Rico (Little and Wadsworth 1964) and from March through May in Cuba (Betancourt Barroso 1987). Not all trees in a stand flower at the same time. Trees in one forest planting began flowering and fruiting about 25 years after planting (Francis 1993). The 2-cm-wide blue flowers grow in clusters at the twig terminals. The orange to orange-brown fruits are flattened, two-chambered capsules. At maturity, they split open to expose two seeds that are covered with a red, fleshy aril (Little and Wadsworth 1964). Fruit and seed production is usually abundant. Fruits in one collection in Puerto Rico weighed an average of 0.39 ± 0.11 g each (Francis and Rodríguez 1993).

Fruits that are beginning to split can be picked up from the ground, picked by hand from low trees, or clipped with pruning poles. Usually, the seeds must be removed from the fruits. They can be removed by hand, or the fruits can be dried in the shade, soaked to soften them, and then wet-sieved to remove the pulp (Betancourt Barroso 1987). The seeds are dried and stored at 5 to 8 °C. However, stored seeds begin to lose their viability after 1 month (Betancourt Barroso 1987). An alternative strategy is to germinate the seeds at once and maintain the slow-growing seedlings in the nursery until needed. Air-dried seeds of *G. officinale* collected in Puerto Rico averaged 3,550 seeds per kg (Francis and Rodríguez 1993).

Germination is epigeous and begins within 10 to 12 days after sowing. In Cuba, up to 60 percent of fresh seeds germinate (Betancourt Barroso 1987). A test using Puerto Rican

seeds resulted in 9-percent germination of fresh seeds, 5-percent with seeds stored for 1 month at 5 °C, 20-percent with seeds stored for 1 month at 26 °C, and 10-percent with seeds stored for 2 months at 26 °C (Marrero 1949). Another test of Puerto Rican seeds obtained only 7-percent germination in the first month, with an additional 41 percent germinating over the next 9 months (Francis 1993). In a test of several seed pretreatments, cycles of daily soaking and drying for 1 week gave the only improvement in germination over untreated seeds (Cooper 1986).

The seeds are usually germinated in trays or beds and transplanted when 2 to 4 cm in height. Seedlings for forest or ornamental plantings are grown in pots or nursery bags. The potting mix should drain well and contain some lime. Seedlings grow to 20 to 30 cm in 18 to 24 months, when they can be outplanted. Long-term weeding will promote successful forestry plantings. Because grazing and browsing animals carefully avoid the seedlings and saplings, planting in overgrazed areas could be a wise establishment strategy. Fire must be completely excluded.