

Carapa guianensis Aubl.

L. A. FOURNIER

Escuela de Biología, Universidad de Costa Rica

MELIACEAE (MAHOGANY FAMILY)

Persoonia guareoides Willdenow, *Amapa guianensis* (Aublet) Steudel, *Xylocarpus carapa* Sprengel, *Carapa latifolia* Willdenow ex. C de Candolle, *Carapa nicaraguensis* C. de Candolle, *Granatum guianensis* (Aublet) O. Kuntze, *Granatum nicaraguensis* C. de Candolle O. Kuntze, *Guarea mucronulata* C. de Candolle, *Carapa macrocarpa* Ducke, *Carapa slateri* Standl.

Acajou, andiroba, andiroba branco, andiroba do igapó, andiroba vermelha, angiroba, bastard mahogany, bateo, bois caille, bois rouge, Brazilian mahogany, British Guiana mahogany, cabirma de Guiana, cachipou, cahoba, cahobilla, camacari, caraba, carapa, carapa blanc, carapa rouge, carapat bogamani, carapote, cedro bateo, cedro cóbano, cedro macho, cóbano, crabbaum, royal mahogany

The geographic range of *Carapa guianensis* extends from Belize, along the Atlantic coast of Central America (and the Costa Rican Pacific watershed), down to Panama. In South America, the species is found in Colombia, Brazil, Peru, Ecuador, and the overflow delta plains of the Orinoco River in Venezuela. It is abundant in the Amazon flood plains, in the states of Para and Amazonas (Brazil), and the Guianas. The tree is also found in the Antilles, from Cuba to Trinidad and Tobago.

Carapa guianensis is an evergreen or deciduous tree that may reach 60 m in height and 2 m d.b.h.; the trunk is straight and cylindrical, with buttresses of 1 to 2.5 m. Lacking branches in the basal one-half or two-thirds of its length, the crown of *C. guianensis* is wide and dense with thick, curved, ascendent, brown branches, and the young shoots are covered by conspicuous lenticels; the bark is flaky and has superficial fissures. Leaves are even-pinnate, alternative, without stipules, displayed in a helical arrangement, and crowded at ends of branchlets, usually with an apical dormant or glandular leaflet, which sometimes results in an odd pinnate leaf. The leaflets are in opposite pairs (3 to 10) and elliptic or elliptic lanceolate with entire margin; acute, obtuse, or acuminate apex; and oblique, asymmetrical, and wide base. The blades are coriaceous, deep bright green adaxially, dull green abaxially, usually reddish when older. The species can grow in pure stands in the lowlands, preferring marsh edges, swamp forests, alluvial riverbanks, and periodically flooded plains. It is a canopy species in humid and very humid tropical forests with an annual rainfall above 3000 mm and a temperature range of 20 to 35 °C. This species usually does not occur above 700 m,

but in some areas of Venezuela, Ecuador, and Guadeloupe Island it can be found above 1000 m.

Ecophene existence seems evident (Flores 1994a) and the populations in the Costa Rican Atlantic and Pacific coasts could be different ecotypes.

Timber is the most valuable product of *C. guianensis* (specific gravity is 0.42 to 0.52); the wood is stable and has multiple uses. However, the wood varies because morphological and physical characteristics differ among habitats (Flores 1994a). The sapwood is pink in green conditions and reddish in dry conditions; heartwood is reddish when green and deeply bright red when dry. The wood has a fine or moderate texture and a high luster; the grain is typically straight, slightly undulated, or sometimes intercrossed. It is decorative in radial planes due to ray-gold glare and the wide longitudinal lines. It is used in cabinetwork, carpentry, turnery, general construction, flooring, boxes, packing, veneer, and masts. Shoemakers use the wood to make heelpieces. Some of the pulp can be used for papermaking. Bark tannins are used in tannery; the carapine alkaloid (C₁₀H₂₈O₄) is used to cure diarrhea, dysentery, rheumatism, eczema, and ulcers. The seeds provide an oil used to make soaps, candles, and insecticides.

The tree flowers primarily from January through March, but may continue through April in some zones. It may also flower in August and September. Inflorescences are large (20 to 80 cm in length), much branched, and axillary or subterminal. Flowers are unisexual and petals are white or creamy, with a light pinkish color externally. The flowers have a delicate musky fragrance; the pistillate has a round or quadrangular

ovary, and the staminate has vestigial ovules. The fruit is a quadrangular, closed capsule 9 to 16 cm wide and almost the same in length.

Fruits mature in 8 months and are harvested from May through August. The dehiscence gives rise to four hard valves and opens partially or totally. The fruit possesses a thick, woody pedice that abscises at maturity, and the fruit falls to the ground. The seedcoat is hard, smooth or rough, and red-brown in color. The seeds are large and angular, and may be classified as overgrown because their development is determined by fruit size and seed number. Water seems to be an important agent in medium- or long-distance dispersal, when trees grow in swamps or near streams.

Seed-producing trees must be selected from those having a diameter over 60 cm and in good sanitary conditions. Seeds must be collected from the ground and transported in sealed, plastic bags with a small amount of water. Seeds average 30 to 35 per kg.

Seeds cannot be stored more than 2 days under normal conditions in the Tropics (temperature 24 to 30 °C; 90 percent humidity). If seeds are dehydrated 12 to 18 percent and provided an adequate level of permanent humidity, some will germinate several months later (30 percent). Seeds are also sensitive to temperatures below 20 °C. Seed germination is hypogeal and seedlings are cryptocotylar; under natural conditions germination begins at 2 weeks. Seeds transported from the field to the greenhouse in sealed, plastic bags with ade-

quate moisture show 92 percent germination. Once in the greenhouse, seeds must be submerged in an insecticide for 15 minutes, washed in running water twice, and kept in sealed, plastic bags with adequate moisture (no more than eight seeds per bag). They are transferred to plastic bags with substrate when radicle emergence starts. Direct sowing in plastic bags is also possible, to expedite plumule emergence. A mixture of soil and sand is an adequate substrate for seedling germination, but the humidity must be kept constant. Seedlings must be outplanted by 6 months. Under greenhouse conditions, the epicotyl suffers dieback in 20 percent of the seedlings, and the seedlings are shade tolerant during the first stages of development.

ADDITIONAL INFORMATION

This species provides food and nesting for many birds, including species of *Ara* spp., macaws, and Amazon parrots. Collared peccaries (*Tayassu tajacu*), white-lipped peccaries (*T. pecari*), and some large rodents such as agouties (*Dasyprocta punctata*) and pacas (*Agouti paca*) are the most important predators and dispersers of seeds. The roots of young seedlings are predated by the armored rat (*Hoplomys gymnurus*). The attack of some insects, such as *Hypsiphyla* moth, is strong and has a negative effect. *Hypsiphya ferrealis* destroys the seeds, *H. grandella* attacks seeds and young shoots, and *Rhizopos* sp. produces seed rotting (Arguedas and others 1993).

