Copaifera aromatica Dwyer

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FABACEAE (BEAN FAMILY)

No synonyms

Camíbar, kamibar (Holdridge and Poveda 1975)

Copaifera aromatica is an endemic species in Panama, Costa Rica, and Nicaragua (Holdridge and Poveda 1975). The species grows in the canopy of pristine forests.

Copaifera aromatica is a fast-growing tree that reaches 35 m in height and 90 cm d.b.h. It has a straight and almost cylindrical bole that is covered with numerous and conspicuous lenticels. The bark is reddish brown and aromatic, and exfoliates in very thin, scaly layers (Holdridge and Poveda 1975, Jiménez, 1993, Quesada and others 1997). Leaves are alternate and paripinnate, with 8 to 12 leaflets and a thin, glabrous petiole. Leaflets are alternate, ovate-oblong, 2.5 to 9 cm long and 1.5 to 3.5 cm wide with translucid points, entire margin, small retuse apex, and obtuse base. The leaflets are usually glandular pellucid-punctate (at least when young) with a strong marginal vein. The margin often has glands or domatium-like swellings at the distal and proximal ends of the blade. Leaflets could be subsessile or petiolulate; petiolules are straight or slightly twisted (Cowan and Polhill 1981, Holdridge and Poveda 1975, Jiménez 1993, Quesada and others 1997, Van Roosmalen 1985). *Copaifera aromatica* grows in the humid and very humid evergreen forests typical of the neotropical lowlands. It grows at elevations ranging from sea level to 350 m where the temperature range is 28 to 35 °C and annual rianfall is more than 3000 mm. The species is found in fertile flat plains; however, it also has been observed in partially flooded areas.

The timber is moderately soft and heavy, and exhibits a sharp color difference between sapwood and heartwood. When fresh, the sapwood is light brown and the heartwood is dark brownish yellow. The heartwood darkens after exposure to light and air. The wood has medium texture, straight grain, low to medium luster, no distinctive odor, and a slightly bitter taste (Herrera and Morales 1993, Richter 1973). Fine, regular, light-colored bands demarcate growth rings. The figure shows silvery bands at the radial surface; these bands are inconspicuous at the tangential plane (Richter 1973). The basic specific gravity (oven-dry weight/green volume) for *Copaifera aromatica* is 0.62. The green weight is 970 kg per m^3 (56 percent moisture content). Wood drying is moderately slow, and the wood may have moderate defects such as twisting. Radial shrinkage (green to oven-dry) is 4.1 percent; tangential shrinkage, 7.4 percent; and volumetric shrinkage, 11.7 percent (Llach 1971). The wood is easy to work and its finished surface is smooth. The wood is used in general and interior construction, carpentry, and turnery and for flooring, furniture, fences, railroad ties, and tool handles (Llach 1971). The tree resin has commercial value.

The tree bark provides hard oleoresins used industrially in the manufacture of varnish and paint (Mabberley 1997). The medicinal copaiba balsam (an oily liquid obtained by tapping) has sesquiterpenes, diterpenes, and triterpenes along with phenols; presumably these compounds provide leaf resistance to fungi. Unusual condensed tannins have also been reported. The chemistry of *Copaifera* is quite similar to that of *Hymenaea*. The resins are used to relieve stomach and kidney pain (Cowan and Polhill 1981, Herrera and Morales 1993, Schultes and Raffauf 1990).

Flowering occurs August through November. The flowers are crowded in racemes or axilar panicles, with small bracts and bracteoles. Flowers are small, distichous and apetalous; they have a short hypanthium. The calyx has four imbricate sepals; the sepals are pale brown and pubescent abaxially. The androecium has numerous free stamens; anthers are introrse and anther dehiscence is longitudinal. Pollen grains are rugulose-punctate to reticulate. The ovary is stipitate, unilocular with one to two suspended ovules and surrounded at the base by a nectariferous disc. The stigma is usually capitate (Cowan and Polhill 1981).

The fruit is a pod, 1.5 to 4 cm long, 1.5 to 2.5 cm wide, and 0.8 to 2.5 cm thick. It is oblong-rounded to ovate-round-

ed, stipitate, laterally compressed and ligneous, with the apex bearing the stylar base. Dehiscing valves fall separately, but may remain attached to sutures in the proximal end. The nonexfoliating exocarp is dull, reddish brown to reddish, glabrous, and rugose with resin globules. The mesocarp is firm, fibrous, resinous, and ligneous; the endocarp is dull and whitish; the area around the seeds is smooth, not exfoliating, and nonseptate. If the fruit is damaged, the epicarp may exhibit resin globules (Gunn 1991). The fruits of *Copaifera aromatica* mature February to April and September to October (Quesada and others 1997).

Seeds (one to two) are parallel to fruit length and not overlapping. The funiculus is up to 5 mm long, thick to filiform, and straight. Seeds are covered by an incomplete red aril. They are 13 to 28 mm long, 9 to 17 mm wide, 3 to 12 mm thick, oblong, and laterally compressed. The testa (partially concealed by the thin aril) is brown, smooth, and hard. The embryo is large, and a basal groin, concealing the radicle, splits the cotyledons. The embryonic axis is straight and oblique to seed length. The plumule is rudimentary. The large, colorful aril surrounding the seed is edible and sugary. Seed dispersal is endozochorous; spider monkeys are the most significant dispersers (Van Roosmalen 1985). Seeds are collected from the ground from September to February.

The species is reproduced by seed. Eighty-five percent germination was obtained in tests performed with fresh seeds collected in the north zone of Costa Rica after soaking them for 24 hours in running water (Jiménez 1993). Seed behavior is orthodox, but no storage tests have been performed. Germination is epigeal, and the seedling is phanerocotylar. Cotyledons are fleshy; eophylls are opposite or alternate, often seraljugate; eophyll leaflets are generally punctate; and the marginal vein is typical in the metaphylls (Cowan and Polhill 1981).

Seeds are sown in greenhouse beds. Seeds are sown directly in the soil or in plastic bags filled with soil and sand. Natural regeneration of the species is very poor, as shown by the low number of individuals found at intermediate stages; seedlings and saplings seem to be shade tolerant (Jiménez 1993).


1cm
2cm