Ochroma pyramidale (Cav. ex Lam.) Urb.

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BOMBACACEAE (KAPOK-TREE FAMILY)

Bombax pyramidale Cav. ex Lam. (Encyclopédie Méthodique, Botanique 2: 552; 1788); *Ochroma lagopus* Sw. (Nova Genera et Species Plantarum seu Prodromus 98; 1788); *Ochroma tomentosa* Humb. & Bonpl. ex Willd. (Enum. Pl. Hort. Reg. Bot. Berol 695; 1809); *Bombax angulata* Sessé & Moc. (Flora Mexicana 169: 1895); *Ochroma concolor* Rowlee (Journal of the Washington Academy of Sciences 9: 161; 1919); *Ochroma grandiflora* Rowlee (Journal of the Washington Academy of Sciences 9: 163; 1919); *Ochroma limonensis* Rowlee (Journal of the Washington Academy of Sciences 9: 163; 1919); *Ochroma velutina* Rowlee (Journal of the Washington Academy of Sciences 9: 164; 1919); *Ochroma bicolor* Rowlee (Journal of the Washington Academy of Sciences 9: 165; 1919); *Ochroma boliviana* Rowlee (Journal of the Washington Academy of Sciences 9: 166; 1919); *Ochroma peruviana* I. M. Johnst. (Contributions from the Gray Herbarium of Harvard University 81: 95; 1928); *Ochroma pyramidale* var. *concolor* (Rowlee) R. Schultes (Botanical Museum Leaflets 9: 177; 1941); *Ochroma tomentosa* var. *ibarrensis* Benoist (Bulletin de la Societé Botanique de France 88: 439; 1941); *Ochroma lagopus* var. *bicolor* (Rowlee) Standl. & Steyerm. (Publications of the Field Museum of Natural History, Botanical Series 23: 62; 1944); *Ochroma lagopus* var. *occigranatensis* Cuatrec. (Phytologia 4: 480; 1954); *Ochroma pyramidale* var. *bicolor* (Rowlee) Brizicky (Tropical Woods 109: 63; 1958)

Algodón, árbol de algodón, balsa, balsa real, balsa wood, balso, bois flot, bombast mahoe, burillo, ceibón botija, ceibón lanero, corkwood, down tree, dum, enea, gatillo, gonote real, guano, jonote real, jopi, jubiguy, lana, lanero, lanilla, mahaudème, maho, mo-hó, mo-ma-há, palo de balsa, pata de liebre, patte de lièvre, pau de balsa, pepe balsa, piú, polak, pomoy, puh, pung, tacarigua, tambor, tami, topa, urú (Pennington and Sarukhán 1968, Record and Hess 1949)

Common in the American lowlands, *Ochroma pyramidale* has a geographic range that extends from southern Mexico to Bolivia and the West Indies (Record and Hess 1949, Whitmore and Hartshorn 1969). The species is an indicator of secondary forests because it occurs in clearings and forest gaps.

Ochroma pyramidale is a fast-growing evergreen tree that may reach 30 m in height and 1.8 m d.b.h. The tree is frequently buttressed. The crown is large, wide, spreading, and sparsely branched; twigs are thick, with leaf and stipule scars, green or greenish brown, lenticellate, with a ferruginous indument, and they exudate a sticky gum (Pennington and Sarukhán 1968). The bark is smooth, with some protuberant linear scars, and grayish, grayish brown, or brown; it has small protuberant lenticels. The inner bark is fibrous, yellowish creme, creamy, or pinkish, turning pinkish brown with age or when exposed to air and light. The average thickness is 8 to 14 mm. Phyllotaxy is spiral. The leaves are simple and stipulate; stipules are broadly ovate and deciduous. It grows well in volcanic or limestone soils that are rich and well drained. The elevation range varies from 0 to 1200 m.

Sapwood is nearly white, creamy, yellowish, or pinkish. The heartwood is pale brown or reddish brown. The wood has a straight grain (sometimes slightly interlocked), high luster, and medium texture. It is odorless and tasteless. The wood is extremely light and has strong variations in weight (basic specific gravity is 0.10 to 0.20). Green wood weighs two or three times more than dry wood. Volumetric contraction is low (6.1 to 10.3) with an unfavorable contraction ratio (2:3). The wood shrinks considerably during seasoning. Wood resistance to endwise compression and static bending is about half that of the best quality spruce (*Picea*) which has a density four or five times greater than *O. pyramidale*. There are woods lighter than

O. pyramidale but they lack its strength (Record and Hess 1949). The wood is stable in use, and changes in atmospheric conditions cause only minor shrinkage or swelling (Longwood 1971). Natural durability is low; the timber is susceptible to termite and fungal attacks. It decays very quickly in contact with the ground and is subject to sapstain if not rapidly dried. The wood is so difficult to air-season that kiln drying is recommended (Longwood 1971). Even this method can produce splitting, warping, casehardening, and a tendency to toast the wood (Longwood 1971). Seasoned wood absorbs water easily if submerged, but this can be prevented with treatments. The heartwood is resistant to preservation but a limited amount of preservative can be injected into it.

Ochroma pyramidale has a good reputation and is the lightest commercial wood in use for different purposes (Longwood 1971). According to Longwood (1971), the wood is used in heat insulation (packing cases for perishable foods, cold storage rooms, aircraft cabins, roof insulation, railway storage cars, refrigerators, water coolers, lining of pith helmets, and packing for armor plate in battleships); buoyancy (rafts, lifebelts, floats for fishing nets and mines, water sports equipment, buoys, and hydroplane floats); sound and vibration insulation (lining for telephone booths, broadcast studios, aircraft, phonograph booths, and subflooring and pads for heavy machinery and other equipment with moving parts); lightness (aircraft streamlining, model airplanes, toys, display models, surgical splints, and theatrical and film sets and accessories); and resilience (protective packing for glass, ceramics, delicate instruments, and furniture). The silky trichomes of the fruit are used to make pillows, mattresses, and cushions; the inner bark provides excellent fibers and the outer bark contains tannins (Record and Hess 1949).

Blooming occurs from December to March. Inflorescences are axillary with a single flower and grouped toward the branch terminal end. The softly scented flowers are hermaphrodite, actinomorphic, pedicellate, pubescent, and three-bracteolate; bracteoles are deciduous. The calyx is infundibuliform, coriaceous, red or purpuraceous, with five imbricate lobules. The corolla has five white petals and is reddish in the margin. It is obovate-spatulate, wide, fleshy, and basally adnate to the staminal column. The androecium has many stamens. The ovary is superior, sessile, and conical and has five locules. There are many ovules per locule; ovules are anatropous, bitegmic, and crassinucellate.

Fruit ripening occurs from March to June. The fruit is a capsule, subligneous, oblong-fusiform, five-angulate, 14 to 28 cm long, 2 to 3 cm in diameter, loculicidally dehiscent, and five-valvate; valves are black, glabrous outside, and densely lanate inside (Pennington and Sarukhán 1968, Whitmore and Hartshorn 1969).

Seeds are dispersed by wind. They are numerous, small, about 5 mm long, pyriform, oily, and imbedded in the pale brown trichomes of the capsule. The embryo is straight and small; cotyledons are thin, with involute margins. Seeds average 100,000 per kg. They must be removed from the mass of hairs inside the fruit. Seed behavior is orthodox.

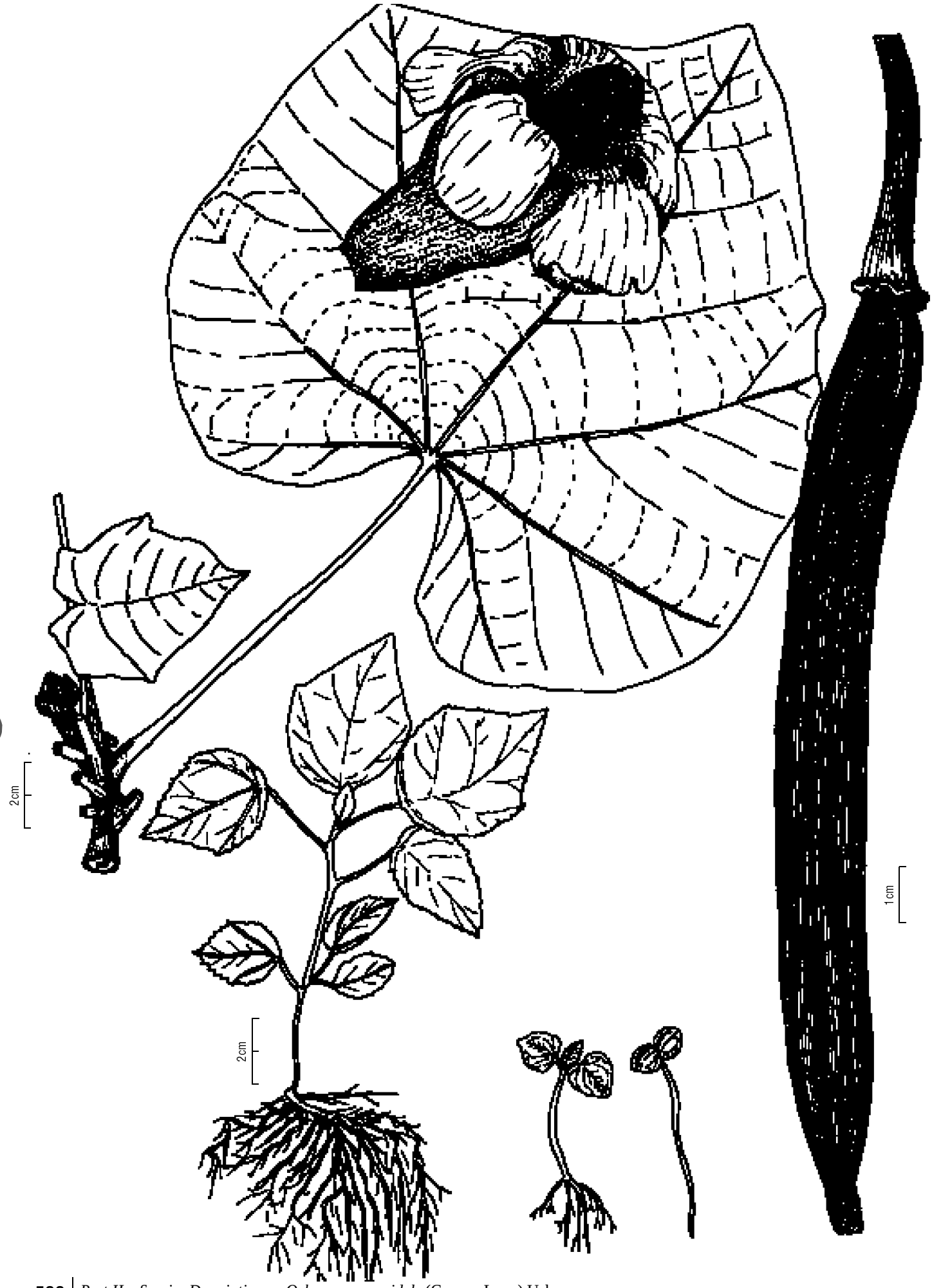
Germination is epigeal and the seedling is phanerocotylar. Seeds must be placed superficially in sand or a porous mixture of substrate and kept under direct sunlight because they are light sensitive. Proper moisture and temperature are necessary. Germination is 70 and 80 percent. Root protrusion occurs in 15 to 22 days. They should be placed in plastic bags when sown because they are very sensitive to transplanting. Until the seedlings are 6 months old, they are easily broken or injured. They are easily damaged in plantations during the first 7 years. Before the sapling reaches this age, the radical system is fibrous; after that, a taproot is developed causing problems in the wood, which changes to a red color and gradually becomes dotty. The bole above the first branch will not produce valuable logs (Record and Hess 1949). The insect *Dysdercus* sp. (F. Pyrrhocoridae) eats the buds, fruits, and seeds.

ADDITIONAL INFORMATION

The most common name applied to this species is balsa. The name means raft and was used by the Spaniards because they observed Indians using the wood to construct rafts (Longwood 1971).

Leaf blades are ovate, wide ovate, ovate-angulate, or three- to five-lobate, and chartaceous. The leaf margin is entire and undulate; the apex or the central lobe obtuse, acute, or acuminate. The leaf base is deeply cordate and sometimes truncate; the upper surface is tomentulose or glabrous; and the abaxial surface, tomentulous with tufted hairs (Pennington and Sarukhán 1968, Whitmore and Hartshorn 1969). Venation is basal actinodromous, with three to five veins diverging radially from the base and some diverging from points at higher levels; veins are prominent beneath. Petioles are long and densely covered by stellate trichomes.

Two corolla lobules are triangular and acute, and three are flabelliform. The stamen filaments form a staminal column, cylindrical, white, enlarged at the base and surrounding the style; it is shortly five-lobate; anthers are sessile, elongated and twisted in a spiral, and extrorse with longitudinal dehiscence. The gynoecium has a filiform style and a stigma slightly exceeding the staminal column; it is spiral and penta-sulcate (Pennington and Sarukhán 1968, Whitmore and Hartshorn 1969).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