

Guyana RED CEDAR

Cedrela odorata

Field characteristics

Cedrela odorata is a (semi-) deciduous, monoecious, medium-sized to large tree up to 30-40 (- 45) m tall (in Guyana/Suriname) with a straight, cylindrical, branchless bole for up to 20 (- 25) m, 50-90 (-180) cm in diameter (in Guyana/Suriname), with low, blunt, fairly straight buttresses, 1.5-2.5 (-3) x 1-2 x 0.2-0.3 m, branched at base. Bark (dark) reddish-brown especially near the base of the bole, greyish brown higher up, longitudinally fissured or ribbed in a diamond-shaped pattern. Fissures 10-60 x 2-4 x 1-2 cm, 5-8 cm apart. Dead bark 4-10 mm thick, (dark) brown, layered, with some lighter brown layers. Living bark 8-10 mm thick, pink or purplish-red (inner half off-white, when exposed to air discolouring to rusty brown), layered, soft, fibrous, with typical cedar-like, offensive garlic scent. Crown flat or rounded, light, branches erect to spreading; branchlets finely to conspicuously lenticellate (Lindeman & Menega, 1963; Polak, 1992; Lemmens, 2008). See Figures 1-3.



Figure 1 Bark of Red Cedar. Source: Polak (1992)

Seedlings with epigeal germination and short taproot. Cotyledons are leaf-like, opposite, ovate, c. 3 x 1.5 cm, apex and base rounded. Two first leaves opposite, trifoliolate with entire leaflets; blades of lateral leaflets narrowly elliptic, c. 0.2 x 0.5 cm; blade at middle leaflet rhombic, c. 3 x 1 cm (Polak, 1992; Lemmens, 2008).

Leaves

Twigs round, lenticellate, glabrous. Leaves alternate, paripinnately compound with (5-) 6-14 (-15) pairs of leaflets; stipules absent; rachis slightly hairy or glabrous,

petiolules puberulous when young; petiole 2.5-7.5 cm long, round; rachis 18-38 cm long, grooved above; petiolules to 2 cm long; leaflets more or less opposite; blades papery or thin-leathery, (narrowly) ovate, often falcate, 5-14 cm long x 3-6 cm wide, glabrous, margin flat, apex slightly acuminate, with obtuse tip, base rounded; primary vein plane above, slightly prominent



Figure 2 Leaf and dry fruits of Red Cedar. Source: Lemmens (2008)

below; secondary veins 7-12 pairs, loop-forming, with some smaller ones in between, prominent above, moderately prominent below; tertiary venation dense (Polak, 1992; Lemmens, 2008).

Flowers

As a monoecious tree, *C. odorata* has flowers of both sexes in the same inflorescence. The inflorescence is a terminal, much-branched, pendulous panicle, 10-40 (50) cm long, glabrous or puberulous; peduncle 0.5-8 cm long; pedicels 1-2 mm long. Flowers functionally unisexual, but with well-developed vestiges of the opposite sex, male and female flowers very similar in appearance, actinomorphic, pentamerous, greenish-white, subsessile, 6-9 mm long, smelling of garlic; calyx cup-shaped, 2-3 mm long, with 5 short teeth; petals 5 free, imbricate and adnate for $\frac{1}{3}$ of their length, forming into a long, columnar androgynophore by a medium carina (therefore preventing their spreading in open flowers); stamens 5, free, 2-3 mm long; ; anthers dorsifixed, opening by longitudinal slits; ovary 5-locular, pubescent; each loculus with 10-14 ovules; style short, stigma discoid (Polak, 1992; Lemmens, 2008; Orwa *et al.* 2009).

Fruits and seeds

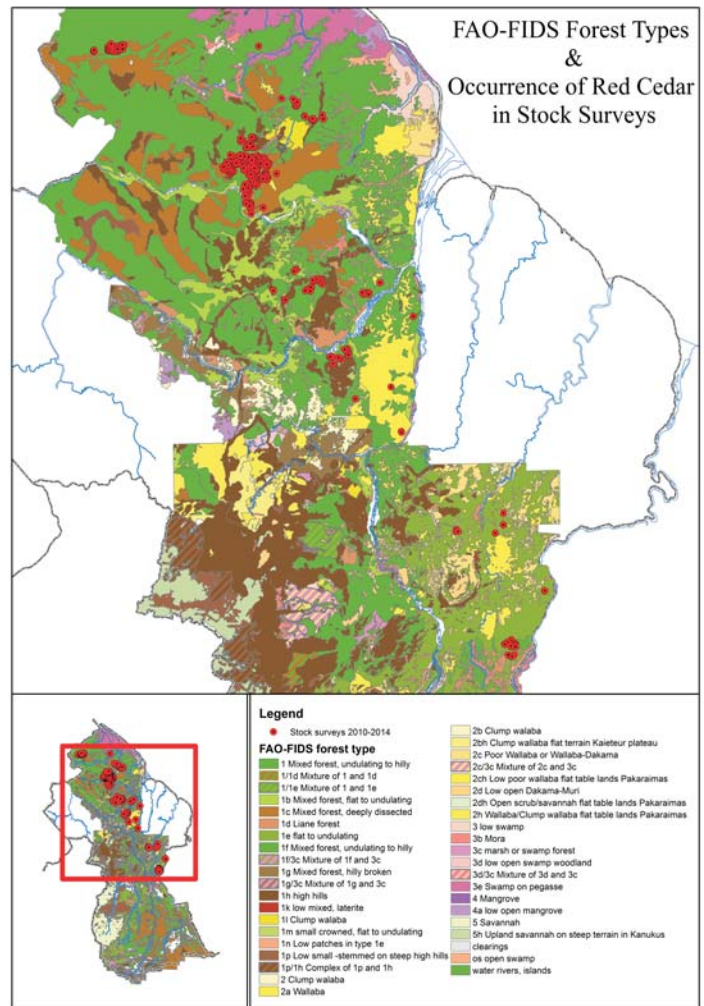
The fruit is a pendulous, woody, oblong-ellipsoid to obovoid capsule, at first green, finally brown-black with numerous lenticels, 3-5 cm long and 2-4 cm in diameter, glabrous, dehiscing with 5 valves, central column with 5 broad wings (Polak, 1992; Lemmens, 2008).

Each fruit contains 13 to 34 developed seeds. The seeds are

samaroid, bulky at their apex, 2 to 3 cm long and 5 mm wide (including the wing). The bulky part is oblong, slightly comose, laterally flattened, 7 to 8 mm long, 3.5 to 5 mm wide, and 1.2 to 1.5 mm thick. The seed-coat is light brown to red-brown, rugose, opaque, chartaceous, and expanded at the base on a thin and brittle lateral wing (Rocas, 2003).



Figure 3 a. habit; b. flower; c. flower, longitudinal section; d. dehiscent fruit; e. seed; f. trunk base; g. seedling.
Source: Polak (1992)



Rarity of Red Cedar in Guyana

Red Cedar appears to be rare in Guyana (< 1 tree/ha), and according to the studied stock surveys the species is even very rare (< 1 tree per 100 ha). According to the three national forest inventories, the estimated average density of red cedar ≥ 10 cm dbh ranges from 1.7 trees per 100 ha (FAO-FIDS) to 8.5 trees per 100 ha (MLI). The estimated density of trees ≥ 35 cm dbh is estimated to range from 0.9 trees per 100 ha (IFP) to 2.0 trees per 100 ha (MLI). Stock surveys conducted between 2010 and 2014 suggest an average of 1.7 trees per 100 ha (maximum 7 trees per 100 ha) in the blocks where the species was encountered. The estimated volume of Red Cedar ≥ 35 cm dbh ranges from 2.4 m³ per 100 ha (FAO-FIDS) to 6.0 m³ per 100 ha (MLI) according to the national forest inventories. An average volume of 8.7 m³ per 100-ha block (maximum of 37.8 m³ per 100-ha block) was reported for the 246 blocks where Red Cedar was encountered during 2010-14.

Site preference and local distribution

The species does not appear to have a specific preference for a certain forest or soil type; it is reported to occur on many soil types from pegasse, to clay, to brown sand and white sand and in many forest types such as swamp forest, mixed forest on flat to undulating, undulating to hilly, deeply dissected terrain and steep high hills, and in wallaba forest on white sand soils.

Forest and soil typing of the inventory plots may have been based on the general area and small-scale ecotope differences, e.g. along small creeks and seasonal streams, may have been overlooked when assessing the plot characteristics. The same applies to forest typing based on the FAO-FIDS regional forest type map and the national vegetation map.



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