

## 21. *Hopea odorata* Roxb.

### Taxonomy and Commercial Grade

Cambodian name	: Koki Masao
Scientific name	: <i>Hopea odorata</i> Roxb.
Plant family	: <i>Dipterocarpaceae</i>
Commercial Grade-Cambodia	: 1 <sup>st</sup> Grade

**Distribution and Habitat:** *Hopea odorata* Roxb. is native to South-East Asia and occurs in the Andaman Islands, India, Myanmar, Laos, Cambodia, Thailand, Vietnam, and northern parts of Malaysia (Dy Phon, 2000). In most of its natural distribution area it is found in lowland tropical forests on deep, rich soils from 0-300 m a.s.l., and often along streams and rivers. The best growth is obtained in areas that receive more than 1200 mm rainfall/year and a mean annual temperature of 25-27 degrees Centigrade.



It grows in a wide range of habitats and is easy to handle as a plantation species. In Cambodia, it grows in closed evergreen forest or in pure stands, either in small groups or alone. It is a shade tolerant tree during the first five years, but later requires sunlight. Due to its sacred essence, in the past, it has only been planted within the grounds of pagodas by a king or monk, although nowadays it is frequently found outside of these areas. It is found in Kratie, Koh Kong, Kampong Thom, Stung Treng, Preah Vihear, Ratanakiri, Mondulkiri and Siem Reap (Khorn, 2002), as illustrated on the map below.

**Gene Ecological Zones:** Coastal Cardamoms (A), Redlands (c), Northwestern Lowlands (D), Central Lowlands (d), Southern Annamites (g).

**Biological Description:** *Hopea odorata* Roxb. is a large evergreen tree species, growing up to 45 m tall and producing boles to 120 cm in dbh. The bole is straight and round and can reach from 15-25 m. The wood has a density of 0.5-0.98 at 15% moisture content (DFSC, 2000) and has a light, gray-yellow colour. The bark is black brown and deeply cracked, the leaves simple and alternate (DFSC, 2000), 8-12cm long and 3-6cm wide (FIPI.1996) with a slightly unequal base. This tree has the highest increment among the dipterocarp species, attaining 0.97cm/yr of breast height diameter and 0.51m/yr for height (CTSP, 2001). Natural regeneration often occurs in areas of low shade.



**Flowering and Fruiting Habit:** Flowering stalks are terminal or axillary, and produce small, unisexual flowers with 5 pinkish, hairy petals. Flowering occurs at more or less regular intervals, usually every two years in trees of more than 8-10 years of age (DFSC, 2000). Flowering occurs from February-March, and fruits ripen from April-May (FIPI, 1996). Fruits are often produced in large quantities, but sometimes only on a few a few branches (DFSC, 2000).

**Fruit and Seed Description:** The fruit is a round nut with a persistent calyx, and about 1 cm in diameter according to DFSC (2000), or 7-8mm in diameter according to FIPI (1996). The calyx has 5 lobes, two of which produce wings from 5-6cm long and 1-2cm wide. There is only one seed per fruit. The seeds are polyembryonic, with an average of 4 embryos per seed (DFSC, 2000).

**Seed Collection:** The seeds of *Hopea odorata* are mature and ready for collection when the wings have turned to a dark brown and the coat has changed from green to yellow. It is important to time collection well, as seeds that are not fully mature have low viability. The fruit is collected directly by climbing the tree, or by shaking the branches over tarpaulins spread on the ground. Collection from the forest floor should be avoided as these seeds have low viability and are often heavily infected by weevils. Fresh seeds have high moisture content and must be kept in loosely folded bags away from the sunlight during transport and temporary storage (DFSC, 2000).

**Seed Handling:** Soon after collection the wings are removed manually and small, immature fruit and insect infected fruit is discarded (DFSC, 2000).

**Sowing and Germination:** For laboratory testing, the seeds (de-winged fruit) are germinated on moist paper or cotton wool at a temperature of 20-30 C. In the nursery the seeds are sown in seedbeds and transplanted into polyethylene bags after germination. Due to problems with the seed storage, vegetative propagation with cutting is often used. Orthotropic shoots from juveniles (1-4 years old plants) perform best (DFSC, 2000).

**Seedling Production:** The seedlings perform best under 50% shade. After 6-9 months, when the plants have reached a height of 40-60 cm, they are ready to transplant into the field (DFSC, 2000).

**Uses:** The wood has a high value because it is resistant to termites, and therefore, is generally used in house construction, railway sleepers, train-carriages, and especially for river and sea boats (CTSP, 2001). It is suitable for planting on degraded lands and is also widely planted as an ornamental and shade tree (DFSC, 2000). The bark has high tannin content, suitable for tanning leather, and produces a resin. It is used to treat diarrhoea, and forms part of a remedy for the treatment of inflammations of the gums and incontinence. It can also replace the areca nut in betel quid. This species is used in the manufacture of Cambodian racing boats. Following rarefaction due to extensive exploitation, it has been replaced by the wood of *Shorea obtusa* Wallich ("Phchek"; Dy Phon, 2000).

**Current Status:** Dipterocarp forests in general, and *Hopea odorata* forests in particular, are now seriously depleted due to heavy exploitation and degradation of habitats by people and concessions. Large populations of koki masao are now rarely found inside forest concession areas. At present, only scattered trees occur, and therefore, finding mother trees for seed

collection is a difficult task. *Hopea odorata* often grows in moist forests along streams, but when their habitat is destroyed, it cannot regenerate naturally.

In 2002, the second CTSP meeting on the Forest Gene Conservation Strategy defined *Hopea odorata* Roxb. as a priority species in need of immediate conservation interventions and appropriate protection.

**IUCN Classification:** CR A1cd.

**References:**

- Cambodian Forestry Law No. 35, 25<sup>th</sup> June 1988
- CTSP, Cambodia Tree Seed Project, 2001, Some Endangered Species of Cambodia. Unpublished
- CTSP, 2002, Proceedings of the Second Meeting on Forest Gene Conservation Strategy
- DFSC, 2000, Seed Leaflet, No. 49, *Hopea odorata* Roxb., Danida Forest Seed Centre, November
- FA, 2002 (Draft), List of Trade Names of Commercial Wood in Cambodia, Trade Names of Commercial Wood
- Dy Phon, 2000, Dictionary of Plants used in Cambodia
- Forest Inventory and Planning Institute (FIPI), 1996, Vietnam Forest Trees
- Khorn, S, 2002, Distribution of Selected Tree Species for Gene Conservation in Cambodia
- Ministry of Agriculture, Forestry and Fisheries, 1986, Decision No. 050 SSR.KSK: Wood Classification and Minimum Diameter for Allowable Cutting, 12<sup>th</sup> September.
- UNEP World Conservation Monitoring Centre, 2002, Red List for Cambodia, Second
- CTSP Meeting, 29 Jan. 2002, on Forest Gene Conservation Strategy

