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Neobalanocarpus heimii (King) Ashton

Taxonomy and nomenclature

Family: Dipterocarpaceae

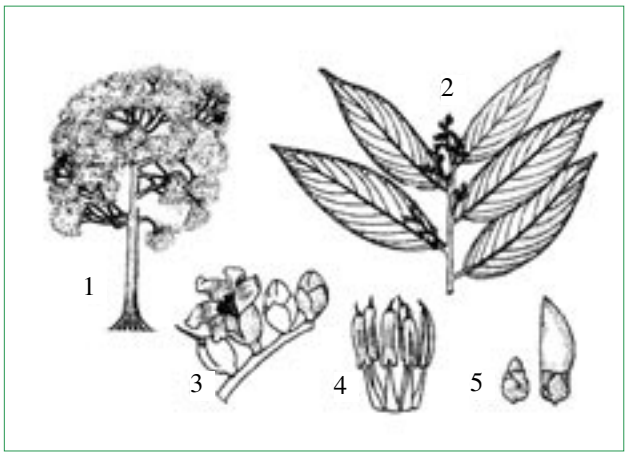
Synonyms: *Balanocarpus heimii* King; *B.wrayi* King; *B. accuminatus* Heim.; *Pierrea penangiana* Heim ex Brandis.

Vernacular/common names: chengal (trade name); chengal, chengai (Malaysia); takhian-chan, takhian-chantamaeo, chi-ngamat (Thailand).

Distribution and habitat

The area of natural distribution is limited to Peninsular Malaysia, Thailand (south of Pattani) and Indonesia where it may be extinct. In Malaysia it has been one of the most popular hardwoods and has been heavily logged throughout the state. It is still common in a number of forest reserves in Malaysia but never abundant and export in log form is now banned. On the 2002 IUCN Red List of Threatened Species it is listed as vulnerable. In general, the species is over-exploited, has poor regeneration and is in need of *in situ* conservation.

It is found in tropical lowland forests below 1000 m altitude, especially on well-drained soils on undulating land. In Thailand it occurs in Hill Dipterocarp forest along slopes and in valleys, often growing with *Shorea curtisii*. Best growth is achieved in areas with more than 2000 mm rain per year and no prolonged dry season. It is not tolerant to frost.



1, tree habit; 2, flowering twig; 3, inflorescence; 4, stamens; 5, young and mature fruit. From: Soerianegara and Lemmens (1994).

Uses

Chengal produces a very durable and heavy timber with air-dry density of 915-980 kg/m^3. The sapwood is pale yellow, the heartwood is light-brown and darkens on exposure. It is easy to work and can be used for a variety of purposes. It is suitable for all forms of heavy construction and particularly for boat-building. Like teak, the timber contains preservative compounds that protects the heartwood and even under exposed conditions the timber can last about 100 years. The breaking strength is several times that of oak, both radially and horizontally.

Botanical description

Large tree, sometimes more than 60 m tall and with a diameter of 1 m or more. The bole is straight and branchless for 30 m or more, with prominent buttresses. The bark is characteristically dark and scaly and the exuding resin, called dammar penak, is almost colourless.

Leaves are alternate and simple, leathery, 7-17 cm long and 2.3-5 cm wide. Flowers bisexual, with 5 cream-coloured or greenish petals, in up to 9 cm long inflorescenses.

Fruit and seed description

Fruit: an acorn-like wingless nut, oblong and cylindrical, up to 5 cm long, at the base enclosed in the woody sepals, the outer two of which are slightly smaller and thicker then the inner three. At the time of maturity the fruits begin to turn from green to brown.

During germination when the radicle elongates, the fruit splits into three equal valves.

Seed: the seed is shaped like the fruit and a few mm shorter. At maturity the seeds are green.

Flowering and fruiting habit

Unlike most dipterocarps, *Neobalanocarpus heimii* sets flowers and fruits every year but the time varies from year to year. In Malaysia in 1999 ripe fruits were collected in August while in 2001 collection took place in December.

Planted trees have been known to set fruits as early as the age of ten years. Pollination is by insects especially honey bees.

Processing and handling

Mature fruits have a very high moisture content (over 50%) and should be transported in open or loosely folded bags, allowing ventilation. The bags should not be stacked and should be protected from desiccation and direct sunlight.

Storage and viability

The seeds are desiccation sensitive and cannot be stored for long. A recent trial in Malaysia showed that when seeds were dried down from 50% moisture content (fresh) to 40%, germination dropped from about 100% to less than 80%. Seeds that were dried below 10% moisture content lost viability completely.

A storage trial showed that seeds with moisture content of 40-45% maintained about 50% viability after three months storage at both 16 and 25°C. After 5 months almost all seeds had lost viability.

Dormancy and pretreatment

The seeds have no dormancy and pretreatment is not necessary.

Mature fruits, open fruit with seed inside and embryos. Photo: Jayanthi Nadarajan, FRIM.

Sowing and germination

There is little experience with propagation in nurseries. The seedlings do not tolerate neither dense shade nor unshaded conditions and they are often badly damaged by insects. Planting in open, unshaded conditions, in association with rubber has failed.

In Malaysia, planting in secondary forests has been carried out successfully. It is important that the seedlings are shaded but for further development light is required.

Germination is rapid and the germination percentage for fresh seeds is normally very high. Growth is slow. Under optimal conditions the trees will attain an estimated diameter of 64 cm in 75 years.

Tree habit: Mature tree (50 cm diameter), FRIM, Kepong, Malaysia. Copyright: L.G. Saw

Selected readings

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