Artocarpus integer (Thunb.) Merr.

Moraceae

LOCAL NAMES
Burmese (sonekadat); English (jack tree,cempedak); Hindi (kathar,kathal); Indonesian (baroh,chempedak,campada,campedak); Javanese (comedak,cempedak,campedak); Malay (chempedak,baroh,bankong); Tamil (chakka,pilual); Thai (champada); Vietnamese (mit to nu)

BOTANIC DESCRIPTION
Artocarpus integer is a large tree with a dense crown, reaching a height of 15 m or more; the cylindrical stem is rounded at the ends; bark grey-brown to dark brown with warty excrescences; blaze pale pink to yellow, exuding a copious milky latex when cut.

Inflorescence solitary, axillary, cauliflorous or ramiflorous, on short, leafy shoots; male heads cylindrical, 3-5.5 cm x 1 cm, whitish-yellow, peduncle 3-6 cm long; female heads with simple filiform styles, exserted to 1.5 mm.

Leaves obovate to elliptic, 5-25 cm long and 2.5-12 cm wide, with cuneate to rounded base; margin entire; pointed tip and 6-10 pairs of lateral veins curving forward; leafstalk 1-3 cm long.

Fruits cylindrical to almost globose; 20-35 x 10-15 cm; yellowish or brown to orange-green; they hang on short, thick stalks from stems of large branches; each fruit contains many kidney-shaped seeds with a thin, white coriacous testa.

The generic name comes from the Greek words ‘artos’ (bread) and ‘karpos’ (fruit); the fruits are eaten and are commonly called breadfruit.

BIOLOGY
Seedlings start bearing fruit after 3-6 years; clonal trees bear after 2-4 years. Flowers may be found at any time of year, but bloom is concentrated around February-April in Malaysia, July-August in Java, and September-October in Australia. Female flower heads are found only on cauliflorous shoots; most male heads are formed on shoots in the periphery of the canopy. This may facilitate pollination by wind, although the pollen is sticky. Insects visit the scented male inflorescence, not the female ones, which lack nectar. Fruit growth is rapid during the 1st weeks following stigma emergence. Stigmas remain receptive for 1-2 weeks. Maturation time is 3-6 months, depending on genotype and climate.


Detail of trunk and fruits. (Gentry A.)


Ripe fruit cut open. (Gentry A.)

ECOLOGY
A. integer is an understorey tree commonly found growing in secondary and sometimes primary forests in lowland tropical rainforest areas up to 500 m altitude or sometimes higher, where there is no distinct dry season.

BIOPHYSICAL LIMITS
Altitude: 0-1200 m, Mean annual temperature: 3-47 deg. C, Mean annual rainfall: 1250-2500 mm

Soil type: Uneroded, well-drained soils of high silica and aluminium content are necessary for the growth of A. integer. The tree tolerates temporary waterlogging.

DOCUMENTED SPECIES DISTRIBUTION

Native: India, Sri Lanka
Exotic: Indonesia, Jamaica, Kenya, Malaysia, Myanmar, Tanzania, Thailand, Uganda, Vietnam

The map above shows countries where the species has been planted. It does neither suggest that the species can be planted in every ecological zone within that country, nor that the species can not be planted in other countries than those depicted. Since some tree species are invasive, you need to follow biosafety procedures that apply to your planting site.

PRODUCTS
Food: The unripe fruit is used as a vegetable or is made into pickle; ripe fruit is eaten fresh or preserved in syrup. The fruit contains large seeds enclosed in a yellow, juicy sheath with a strong flavour. The 2 common fruit varieties are kapa and barka. The former has a sweet, fleshy, crisp pericarp while the latter is inferior and has a thin mucilage and sour pericarp. A. integer seeds are rich in starch and are eaten.

Fodder: In Kerala and Bengal in India, the leaves are lopped for fodder. Ripe fruit is fed to cattle; elephants eat the bark, leaves and fruit.

Fuel: A. integer is a good fuelwood; the calorific value of moisture-free heartwood is 5369 kcal/kg of wood.

Fibre: The bark can be used for rope making.

Timber: Wood, sold under the trade name jack, is as strong as teak (Tectona grandis), takes a good polish, saws and works easily, and is durable under water. It is generally not attacked by fungi and termites.

Gum or resin: A resin exudate from the tree is used as a varnishing material and as birdlime.

Latex or rubber: The latex from A. integer has no value.

Tannin or dyestuff: The bark contains tannin. With alum, the extract of heartwood provides a yellow dye that is moderately fast on silk. This dye is used in colouring the saffron-coloured robes of Buddhists.

SERVICES
Reclamation: A. integer is well suited for reforestation in association with other species such as Tectona grandis (in India) and Eucalyptus platyphylla (in Java).

Intercropping: A. integer has been planted in conjunction with cash crops such as Carica papaya, in taungya or cooperative reforestation systems.

TREE MANAGEMENT
A. integer grows fast in full light but can be raised under shelter at a slower rate, as it tolerates shade in early life. Neglect of thinning may lead to die-back. Trees fruit and bear seeds profusely, but the observed natural regeneration has not been used in management. Plantations may need to be fenced with wire netting against grazing animals.

GERMPLASM MANAGEMENT
A. integer exhibits a recalcitrant seed storage behaviour; no whole seed or excised embryo remains viable when the mean seed mc is reduced to 30.2% and the embryo mc to 25.7%. Seed are stored in pits covered with about 5 cm dry earth. There are 40-50 seeds/kg.

PESTS AND DISEASES
Among the large number of insects that damage the wood are the larvae of Lymantria grandis, Perina nuda and Prodenia litura, which defoliate the leaves. The maggots are Chaedacus ferrugineus and Chaedacus ferrugineus var. incisus. The root rotting fungi Ganoderma lucidum, Rosellinia arcuata, Ustulina densta and Corticium salmonicolor cause stem canker, and Fomes durissimus causes heart rot. Leaf spot fungi have also been recorded. Dendrophthoe falcata is a common parasite of the tree.

FURTHER READNG

Anon. 1986. The useful plants of India. Publications & Information Directorate, CSIR, New Delhi, India.

Bor NL. 1980. Manual of Indian Forest Botany. JJ Reprints, India.

Gupta RK. 1992. Multipurpose trees for agroforestry and wasteland utilization. Oxford & IBH Publishing Co. PVT. Ltd.

Hong TD, Linington S, Ellis RH. 1996. Seed storage behaviour: a compendium. Handbooks for Genebanks: No. 4. IPGRI.

Lamprecht H. 1989. Silviculture in the tropics: tropical forest ecosystems and their tree species; possibilities and methods for their long-term utilization. Dt. Ges. für. Techn. Zusammenarbeit (GTZ) GmbH, Eschborn. (Translated by Brose J et. al.).

Streets RJ. 1962. Exotic forest trees in the British Commonwealth. Clarendon Press, Oxford.

Verheij EWM, Coronel RE (eds.). 1991. Plant Resources of South East Asia No 2. Edible fruits and nuts. Backhuys Publishers, Leiden.

SUGGESTED CITATION

Orwa C, Mutua A , Kindt R , Jamnadass R, Simons A. 2009. Agroforestree Database:a tree reference and selection guide version 4.0 (http://www.worldagroforestry.org/af/treedb/)