

Terminalia catappa

Indian almond-wood, bastard almond, Andaman badam

L.

Combretaceae

LOCAL NAMES

Arabic (Brasilia); Bengali (bangla-badam); Burmese (badan); Creole (zanmande); Dutch (wilde amandel, amandel boom); English (false kamani, Malay almond, myrobalan, Indian almond tree, Barbados almond, bastard almond, Bengal almond, sea almond, Singapore almond, story tree, Malabar almond, demarara almond, tavola nut, country almond, tropical almond, West Indian almond, white bombway, Fijian almond); Fijian (tavola, tivi); Filipino (logo, dalinsi, kalumpit, talisai); French (amandier de Cayenne, amandier de la Martinique, amandier des Indies, badamier, amandier des tropiques); German (etangen baum, Katappenbaum, indischer Mandelbaum); Hawaiian (kamani-haole); Hindi (badambo, deshibadam, patti-badam, badam, jangli-badam, bahera); Indonesian (ketapang); Khmer (kapang, châmbâk, pareang prang, barang); Lao (Sino-Tibetan) (sômz moox dông, hu kwang, 'hou kouang); Malay (jilawa, mentalun, jelawai ketapang, lingkak, telisai, ketapang); Mandinka (gyerte-tubab); Pidgin English (reddish brown terminalia); Portuguese (chapeu de sol, guarda-sol, parasol, amendoeira, castanola); Samoan (talie); Sanskrit (grahadruma); Spanish (almendron, almendrillo, almendro, almendra, almendras, kotamba, almendro del pias, castana, almendro de la India, alconorque); Swahili (mkungu); Tamil (tani, tanti, natvadam); Thai (khon, taa-pang, hukwang, dat mue); Trade name (Andaman badam, Indian almond-wood, bastard almond); Vietnamese (b[af]ng nh[os]c (Bên Tre), mo² c[uws]a, bâng, bâng biên, bâng nu'óc, b[af]ng)

BOTANIC DESCRIPTION

Terminalia catappa is a tall deciduous and erect tree reaching 15-25 m, trunk 1-1.5 m in diameter, often buttressed at the base. Whorls of nearly horizontal, slightly ascending branches spaced 1-2 m apart in tiers, or storeys, up the trunk. The pagoda-like habit becomes less noticeable as the branches elongate and droop at the tips. Bark grey-brown, rough with age.

Leaves alternate obovate with short petioles, spirally clustered at the branch tips, 15-36 cm long, 8-24 cm wide, dark green above, paler beneath, leathery and glossy. They turn bright scarlet, dark red, dark purplish-red, or yellow.

Flowers slightly fetid, greenish-white, very small, with no petals but 10-12 conspicuous stamens, arranged in several slender spikes 15-25 cm long in the leaf axils. The majority of the flowers are male and borne towards the apex, while a few hermaphroditic ones appear below. Some spikes have only male flowers.

Fruit hard, to 7 cm, green-red, rounded and flattened, egg-shaped, with 2 ridges but no wings, 2.5 x 3-6 cm long, yellow or reddish when ripe. The cylindrical, oil-containing seeds are encased in a tough, fibrous husk within a fleshy pericarp. There are about 24 fresh fruits and 160 nuts per kg.

The generic name comes from the Latin 'terminalis' (ending) and refers to the habit of the leaves being crowded at the ends of the shoots.

BIOLOGY

During winter in Florida, especially after a sudden rain, flowers are shed all at once and are quickly replaced with lustrous, silky, purplish new foliage. In Asia, there is a foliage change twice a year. *T. catappa* flowers up to 3 times a year. The ratio of male to hermaphroditic (female) florets is 16:1. *Terminalia* has an effective system of self-incompatibility. Various insects (Coleoptera, Diptera, Hemiptera, Hymenoptera and Lepidoptera) pollinate the flowers. The fruit are eaten and the seeds distributed by fruit bats and birds. The seeds float and can be carried considerable distances on the oceans and still remain viable.



Habit at Baldwin Beach Maui, Hawaii (Forest and Kim Starr)



Leaves at Hanawi stream, Maui, Hawaii (Forest and Kim Starr)



Roadside tree (Rafael T. Cadiz)

Terminalia catappa

L.

Combretaceae

Indian almond-wood, bastard almond, Andaman badam

ECOLOGY

A conspicuous semi-deciduous tree of coastal areas throughout the warm tropics. Grows best in moist tropical climates. The tree is well adapted to sandy and rocky coasts and flourishes on oolitic limestone.

The species loses its leaves twice a year in most areas, with a brilliant red-and-yellow display of leaf colour before doing so. Leaf loss helps it tolerate 1 or 2 annual dry seasons when it occurs. Although Indian almond does grow when planted on uplands, the natural habitat of the species is in areas just inland from ocean beaches, near river mouths, and on coastal plains. These areas are typically flat, but they may have dunes or rocky bluffs.

BIOPHYSICAL LIMITS

Altitude: 0-800 m, Mean annual temperature: 15-35 deg. C, Mean annual rainfall: 750-3 000 mm

Soil type: Oolitic limestone. The species grows in greatest concentration on sands and loamy sands. Also found on silts, loam, and clays. Soil pH is usually neutral to moderately alkaline and rich in bases. However it will also grow in strongly acid soils. Good drainage is required on clay soils.

DOCUMENTED SPECIES DISTRIBUTION

Native: Australia, Cambodia, India, Japan, Laos, Malaysia, Thailand, Vietnam

Exotic: Afghanistan, Antigua and Barbuda, Bahamas, Bangladesh, Barbados, Bermuda, Brazil, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, El Salvador, Fiji, French Guiana, French Polynesia, Gabon, Ghana, Grenada, Haiti, Indonesia, Jamaica, Kenya, Madagascar, Myanmar, Netherlands Antilles, Pakistan, Peru, Philippines, Puerto Rico, Samoa, Singapore, Solomon Islands, Sri Lanka, St Lucia, St Vincent and the Grenadines, Sudan, Surinam, Taiwan, Province of China, Tanzania, Trinidad and Tobago, United States of America, Virgin Islands (US), Zanzibar



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.

Terminalia catappa

L.

Combretaceae

Indian almond-wood, bastard almond, Andaman badam

PRODUCTS

Food: The kernel can be eaten raw or roasted and has an almondlike taste. Sun-dried kernels yield 34-54% of a bland, yellow, semi-drying oil that is edible but becomes turbid on standing. The oil is mainly used in cooking. The flesh of the fruit is also edible but is often fibrous and not very tasty in spite of the pleasant smell.

Fodder: The foliage is used as a feed for silkworms and other animal feeds.

Timber: The tree provides a red, good-quality, elastic, cross-grained timber that seasons well and works easily. Density of the wood is 450-720 kg/m³ at 12% mc. It is strong and pliable and is used for the construction of buildings, boats, bridges, floors, boxes, crates, planks, carts, wheelbarrows, barrels and water troughs.

Gum or resin: The trunk is a source of gum.

Tannin or dyestuff: Bark, leaves, roots and fruit are all important sources of tannin with the astringent bark containing 9-23% tannin. The outer shell is also rich in tannin. The trunk is a source of yellow and black dye; it is used in leather preparation and as a base for inks; sometimes the roots and fruits are used for the same purposes.

Lipids: The kernel contains an extractable edible oil used for cooking.

Medicine: Parts of the tree, such as the leaves and fruit, are astringent. The leaves, crushed with *Dacrydium elatum* and rhizomes of *Cyperus rotundus*, are combined to treat dysentery. The red leaves act as a vermifuge, while the sap of young leaves, cooked with oil from the kernel, is used to treat leprosy. Leaves may be rubbed on breasts to cure pain or, when heated, may be applied to numb parts of the body. They may be used as a dressing for swollen rheumatic joints. Leaves, bark and fruit are used to treat yaws. The bark and root bark are useful for bilious fever, diarrhoea, thrush, and as a remedy for sores and abscesses. The kernel of the fruit mixed with beeswax stops putrid exudation and bloody faeces. It is recommended as a mild laxative and a galactagogue for women, but too frequent use causes diarrhoea. The young leaves are used to cure headaches and colic.

SERVICES

Erosion control: The tree's vast root system binds together both sands and poor soils.

Shade or shelter: In leaf all the year round, the tree casts a heavy shade that is useful in gardens, school grounds or urban areas.

Reclamation: *Terminalia catappa* is tolerant of drought and salt spray and is a promising species for reforestation of sandy areas.

Soil improver: A good provider of mulch for the protection of soil and young crops.

Ornamental: Its distinctive pagoda-like shape, the handsome red colour of the leaves before they are shed, and its fast growth (often in excess of 1 m/year) make the tree valuable as an ornamental species. Planted at low elevations in tropical countries throughout the world because it is both hardy and attractive.

Other services: Planting of this tree can help eradicate *Imperata cylindrica* and other unwanted grasses.

Terminalia catappa

L.

Combretaceae

Indian almond-wood, bastard almond, Andaman badam

TREE MANAGEMENT

Before planting, fertilizer should be applied to poor soils. Although the seedlings develop slowly at first, growth soon accelerates. Weeding is necessary for a few months after planting, but there is soon sufficient cover to shade out competition. It will coppice as a seedling or sapling, but the species is not a strong sprouter. The species is known to form natural root grafts and has natural pruning characteristics.

GERMPLASM MANAGEMENT

Orthodox seed storage behaviour; seeds remain viable for a long time and germinate readily, even after floating in water for long distances. There are 150-860 seeds/kg.

PESTS AND DISEASES

Terminalia catappa is susceptible to defoliating insects, especially when young. Grasshoppers and beetles are especially troublesome in Malaysia. The most serious pest in Puerto Rico is a thrips, *Selenothrips rubrocinctus*, which causes leaf discoloration and premature defoliation of adult trees. It is also listed as being susceptible to attack by the West Indian termite *Cryptotermes brevis*. The sapwood is susceptible to attack by *Lyctus* species.

The thermophilic fungus *Paecilomyces varioti* causes die-back of *T. catappa* seedlings. The use of benlate and adequate daily watering have been found to reduce the incidence of the disease.

Terminalia catappa

L.

Combretaceae

Indian almond-wood, bastard almond, Andaman badam

FURTHER READNG

- Anon. 1986. The useful plants of India. Publications & Information Directorate, CSIR, New Delhi, India.
- Beentje HJ. 1994. Kenya trees, shrubs and lianas. National Museums of Kenya.
- Dale IR, Greenway PJ. 1961. Kenya trees and shrubs. Buchanan's Kenya Estates Ltd.
- Francis JK. 1989. *Terminalia catappa* L.: Indian almond, almendra. SO-ITF-SM-23. Rio Piedras, Institute of Tropical Forestry.
- Gbadegesin RA. 1991. The preliminary investigation on dieback of *Eucalyptus cloeziana* and *Terminalia catappa* seedlings in the northern Guinea zone of Nigeria. *Savannah (Nigeria)*. 12(1):73-76.
- Gunasena HPM. 2007. Chapter 17. Kottamba: *Terminalia catappa* L.: In: Pushpakumara, DKNG, Gunasena HPM, Singh VP. 2007. eds. Underutilized fruit trees in Sri Lanka. World Agroforestry Centre, South Asia Office, New Delhi, India. p. 437-451.
- Hayward DF. 1990. The phenology and economic potential of *Terminalia catappa* L. in south-central Ghana. *Vegetation* 90:125-131.
- Hong TD, Linington S, Ellis RH. 1996. Seed storage behaviour: a compendium. Handbooks for Genebanks: No. 4. IPGRI.
- ICRAF. 1992. A selection of useful trees and shrubs for Kenya: Notes on their identification, propagation and management for use by farming and pastoral communities. ICRAF.
- Lanting MV. 1987. Talisai: another tree of multiple uses. Canopy Forest Research Institute. Philippines. 12(4).
- Lanzara P. and Pizzetti M. 1978. *Simon & Schuster's Guide to Trees*. New York: Simon and Schuster
- Lemmens RHMJ and Wulijarni-Spetjiptoed. 1991. Dye and tannin producing plants: Plant Resources of South-East Asia. No. 3. Pudoc Wageningen. Netherlands.
- Lemmens RHMJ, Soerianegara I, Wong WC (eds.). 1995. Plant Resources of South-east Asia. No 5(2). Timber trees: minor commercial timbers. Backhuys Publishers, Leiden.
- Luna R K. 1997. Plantation trees. International Book Distributors.
- Mbuya LP et al. 1994. Useful trees and shrubs for Tanzania: Identification, Propagation and Management for Agricultural and Pastoral Communities. Regional Soil Conservation Unit (RSCU), Swedish International Development Authority (SIDA).
- Morton JF. 1985. Indian almond (*Terminalia catappa*), salt-tolerant, useful, tropical tree with 'nut' worthy of improvement. *Economic Botany*. 39(2):101-112.
- Noad T, Birnie A. 1989. *Trees of Kenya*. General Printers, Nairobi.
- Oni O, Adedire MO. 1985. Sex ratio and fruit set in *Terminalia catappa* Linn. *Forestry Research Paper, Forest Series*. No. 62.
- Perry LM. 1980. Medicinal plants of East and South East Asia : attributed properties and uses. MIT Press. South East Asia.
- Vogt K. 1995. A field guide to the identification, propagation and uses of common trees and shrubs of dryland Sudan. SOS Sahel International (UK).
- Williams R.O & OBE. 1949. The useful and ornamental plants in Zanzibar and Pemba. Zanzibar Protectorate.

SUGGESTED CITATION

Orwa C, A Mutua, Kindt R , Jamnadass R, S Anthony. 2009 Agroforestry Database:a tree reference and selection guide version 4.0 (<http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp>)