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Kundu, Maitreyee; Schmidt, Lars Holger; Jørgensen, Melita Joan

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SEED LEAFLET

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Madhuca longifolia (Koenig) J. F. Macb

Taxonomy and nomenclature

Species name: *Madhuca longifolia* (Koenig) J. F. Macb. var. *latifolia* (Roxb.) Cheval.

Family: Sapotaceae

Synonym(s): *Madhuca latifolia* Macb., *Bassia latifolia* Roxb., *Mahua indica* J.F. Gmel.

Varieties: *Madhuca longifolia* (Koenig) J.F. Macb. var. *longifolia*, and *Madhuca longifolia* (Koenig) J.F. Macb. var. *latifolia* (Roxb.) Cheval.

Vernacular/Common name: Honey tree, butter tree (English), mohua (India), mi, illuppai (Sri Lanka).

Distribution and habitat

The species is distributed in northern, central and southern part of peninsular India, Sri Lanka and Burma. Of the two varieties, var. *longifolia* is distributed in Sri Lanka, Southern India extending northwards to Maharashtra and Gujrat; var. *latifolia* is found in some parts of central and north India and Burma. It is common in dry mixed deciduous forests, dry sal forest and dry teak forests. The tree grows on a wide variety of soils but thrives best on sandy soil. It also grows on shallow, bouldery, clayey and calcareous soils. It is found up to an altitude of 1200 m, mean annual maximum temperature 28°C-50° C, minimum 2°C-12° C; annual rainfall from 550-1500 mm. The species is drought-resistant, strong light demander and readily suppressed under shade. It is not frost-hardy.

Use

The heartwood is reddish brown, strong, hard and durable; it is used for house construction, naves and felloes of cartwheels, door and window frames. The sweet, fleshy corollas are a rich source of sugars, vitamins, calcium and essential oil and eaten raw or cooked, used in manufacture of country liquor and vinegar. A full grown tree can produce up to 90 kg of flowers in a year. Outer fruit coat is eaten as a vegetable and the fleshy cotyledons are dried and ground into a meal. The fruit contains 51% valuable oil known as mohua oil or butter of commerce, that is used for cooking, illumination, soap and candle making. Leaves, flowers and fruits are used as fodder. Seed cake is also fed to cattle.

Botanical description

Madhuca longifolia is a medium to large deciduous tree up to 18 m high with short bole, spreading branches and large rounded crown. Bark is grey to black with vertical cracks, exfoliating in thin scales. Leaves are clustered near the ends of branches, elliptic or elliptic-oblong, 7.5-23 cm x 3.8-11.5 cm, coriacious, pubescent when young, almost glabrous when mature. Flowers are in dense fascicles near ends of branches, many, small; calyx coriaceous; corolla tublar, fleshy, cream-coloured, about 1.5 cm long, scented, caduceus. The two varieties are quite similar morphologically but vary in habitat and some morphological characters. For example var *latifoli*a is deciduous (Feb-April) whereas var. *longifolia* is evergreen. Leaves of var. *longifolia* are linear-lanceolate, those of var, *latifolia* elliptic or elliptic-oblong.

Madhuca longifolia, flowering banch

Fruit and seed description

Fruits: Fruits are berries, ovoid, fleshy, turning yellowish green when ripe, 3-5 cm long, with prominent distal beak, 6 loci in ovary but usually only developing 1-4 seeds.

Seeds: Seeds are large, 3-4 cm long with moderately hard testa, elliptical, flattened on one or two sides, brown and shining when mature. Seed weight collected from different sources is 420-670 seeds/kg.

Flowering and fruiting habit

The flowers appear from March to May just before the new leaves flush. It takes about 32-35 days for complete development of visible flower bud to anthesis. The flowering varies with the local conditions. It shows a temporal sequence, starting from top portion to the lower branches and also from the more illuminated part to the shaded

part of the tree. The plant produces abundant pollen which is shed in clouds when the flowers are disturbed. The freshly dehisced pollen is sticky and becomes viable only after 2 days when dry. Pollination is anemophilic.

The flowering *Madhuca* is visited by monkeys, squirrels, birds. The fleshy scented corolla is an attractant to the predators. Although the predators help in the dispersal of pollen grains they do not actually transfer pollen grains to the stigma. The elongated style projects out of the flower and beyond the reach of self-pollen and ensures better exposure of stigma to air currents. The seed setting is low even in hand pollination. Fruits ripen in May-July. The tree begins to bear fruits at the age of 8-15 years and continues to do so for about 60 years. The tree shows pronounced periodicity with good seed years once or twice in every three years. 100-200 kg fruit per tree can be produced in cultivated areas whereas 20-50 kg fruit per tree can be collected from forest areas.

Seed collection

Fruits fall on the ground after maturation in the July (monsoon period) and seeds are liberated after decay of fleshy covering. Wild animals disperse the seeds by eating the fruits. The season for seed collection is short and in the absence of organized harvesting, a considerable portion of crop is lost. Maximum germination occurs when the seeds are fully mature. Fruits are then yellowish green in color and seeds are brown with 40-41% moisture content. The seeds may be collected after natural seed fall or by vigorous shaking of the branches.

Processing and handling

Seeds are separated from the fruit flesh by rubbing the fruits manually and thorough washing.

Dormancy and pretreatment

Germination percentage is high in fresh seeds (80-1000%). Seeds have no dormancy and do not need any treatment for better germination.

Storage and viability

Viability of *Mahua longifolia* seeds cannot be maintained in long-term storage. The freshly mature seeds are desiccation-sensitive (recalcitrant) and germination percentage starts to decline below 35% moisture content. Seeds are also chilling sensitive, damage may occur even at 15°C. High viability can be maintained up to 5 months by storing seeds at 28°C in sealed polythene bags with shedding moisture content of 40-41%. This method maintained about 82% germination percentage from initial 100%. The seeds may be treated by dressing with Bavistin 0.2% (fungicide) before storing.

Sowing and germination

The tree can be raised by direct sowing or planting out nursery-raised seedlings, the former method is preferred as the seedling develop long and delicate taproot that is difficult to handle during pricking or transplanting. Germination is hypogeal. In direct sowing seeds are sown in 1.5-2.5 cm depth of soil during June-July in well-prepared lines or patches. Nursery-raised seedlings are pricked out into deep containers (bamboo baskets, earthen pots or polythene bags) one month after germination. It can be successfully raised with agricultural crops like pulses and lucerne with 9m spacing. Regular watering is necessary.

Phytosanitary problems

The leaves are eaten by caterpillars of *Achaea janata* , *Anuga multiplicans*, *Bombotelia nugatrix*, *Metanastria hyrtaca* and a few species of *Rhodoneura*. The larvae of *Acrocercops euthycolona* and *A. phaeomorphia* mine the leaves and blotch them. The bark is destroyed by white ants (*Odontotermes obesus*) and the bark borer, *Xyloctonus scolytoides*.

Selected readings

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Author: Maitreyee Kundu, E-mail: *spallwest@yahoo.co.in*

Editor: Lars Schmidt, Melita Jørgensen

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