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Melia volkensii Guerke

Taxonomy and nomenclature

Family: Meliaceae
Synonyms: none
Vernacular/common names: Melia, tree of knowledge (Eng.); mukau (Kenya); boba (Somalia).

Distribution and habitat

The area of natural distribution is the semi-arid zone of Ethiopia, Somalia, Kenya and Tanzania where it is found at altitudes between 350 and 1700 m, in areas with mean annual rainfall of 300-800 mm.

Common in deciduous bushland in association with acacia-commiphora vegetation. It can grow on most soils; sandy, clay and shallow stony soils, but preferably with good drainage.

Uses

The species is mainly planted for its timber which is durable and termite resistant. The timber is used for construction and furniture and is one of the principal species used to make log hives because the wood is easy to work and shape. It coppices well and is fast growing with a rotation of 10-15 years.

Twigs, leaves and fruits are used to make fodder for goats, cattle and sheep during the dry season and trees are commonly planted around homesteads for shade and firewood.

In parts of Kenya it is the most commonly planted tree on cultivated and cleared lands. The trees are planted at 10-15 m spacing and pruned to avoid competition for light with the crops. Pruning is carried out during periods when other fodder sources are scarce. Because of its drought tolerance and high timber value, this species has great potential for smallholders especially in marginal areas.

Like neem, *M. volkensii* contains compounds (although not azadirachtin) that are toxic to insects and aqueous extracts of the fruits are traditionally used to control fleas and ticks.

Botanical description

Deciduous tree, 6-20 m tall with diameter typically about 25 cm. The crown is open and the bark is grey and fairly smooth.

Leaves are bright green, up to 35 cm long, compound, with 3-7 deeply lobed leaflets that are densely hairy when young. The flowers are small, white and fragrant, arranged in loose inflorescences.

Fruit and seed description

Fruit: the fruit is a 3-4 cm long, ovoid drupe, yellow at maturity later turning pale grey due to the deposit of cork. Each fruit contains one seed that is enclosed in a very hard and thick endocarp (stone). There are about 200 stones per kg.
Seed: the seeds are oval, about 2 cm long and 0.5 cm wide. At one end is an appendage called the caruncle.

Tree in cropland. Photo: Bernard Muok

Flowering and fruiting habit

The tree is deciduous, shedding its leaves early in the dry season, and new leaves emerge two to three weeks before the onset of the rains. On cultivated lands the leaves are normally shed later into the dry season. Reproductive buds develop only at the end of branches. They are generally larger than the vegetative buds.

Flowering and fruiting do not follow a seasonal pattern. It can take place two or three times per year but fruits, even on the same branch, can be at very different stages of maturity. Fruits normally ripen 12-13 months after the time of flowering.

The trees have been reported to start flowering as early as 2-3 years old. It is unknown how the flowers are pollinated but bees visit the flowers indicating insect pollination. The seeds are dispersed by large mammals that feed on the fruits.

Harvest

Mature fruits can be collected nearly all year round. When the seeds are mature the fruits change colour from green to yellowish-green and the pulp becomes

soft. The endocarp becomes very hard and brittle and the colour of the seedcoat turns from light brown to almost black.

It can be misleading to use only fruit colour as a sign of maturity. During development, cork is deposited on the surface of the fruit. This affects the fruit colour and makes it difficult to distinguish between mature and immature fruits.

Collection is fairly easy, when the trees are shaken the mature fruits, and only those, will drop easily from the tree. A grown tree can produce up to 300 kg of fruits per year. At the time of harvest the fruits have a high moisture content (about 40%) and must be treated gently, protected from direct sun and brought to the processing site as quickly as possible.

Processing and handling

It is important that the fruits are processed quickly after collection to avoid fermentation.

The stones (seed + endocarp) are extracted in a depulper or by using a paste and mortar. After removing the pulp, the stones are washed and surface dried.

Storage and viability

There have been conflicting reports on storage methods. According to a study carried out at KEFRI, Kenya, storage behaviour is orthodox and if the seeds are properly dried (10-15% moisture content) and stored in airtight containers at 3°C they can retain high viability for years. There are other studies that indicate the seeds do not tolerate drying.

Dormancy and pretreatment

One of the factors that limits the use of this species is seed dormancy. The type of dormancy is not yet completely known but it seems to be caused by the extremely hard endocarp and/or the seed coat.

There are effective ways of pretreatment but they are all very labour intensive. To get optimal germination the seeds must first be extracted using a knife to remove the endocarp. After extraction the caruncle is removed and the seedcoat is nicked or cut with a knife. Extracted seeds are very susceptible to fungal infections so extraction should wait until just before sowing.

The traditional method of pretreatment, using stones that have been eaten and excreted by animals, only improves germination slightly.

Sowing and germination

Extracted and scarified seeds will normally germinate very quickly. Before sowing it is recommended to soak the seeds in water for 18 hours.

Optimal temperature for germination is 25-37° and studies have shown that once the seeds have been imbibed they are damaged by temperatures below 25°C and above 37°C. As a result of this, it is strongly recommended to shade seedbeds and only water early in the morning and late in the evening when soil temperatures are low.

The seedlings are highly susceptible to damping-off. Vegetative propagation by root cuttings is possible while there has been little success using stem cuttings as rooting is difficult.

Fruit (top left); stones after depulping (top right); seeds. Photo: William Omondi, KEFRI

Selected readings

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