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Sclerocarya birrea

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Sclerocarya birrea (A. Rich.) Hochst.

Taxonomy and nomenclature

Family: Anacardiaceae

Synonyms: *Commiphora subglauca* Engl.; *Poupartia caffra* (Sond.) H. Perrier; *Sclerocarya caffra* Sond.; *S. caffra* Sond. var. *dentata* Engl.; *S. caffra* Sond. var. *oblongifoliata* Engl.; *S. schwein-furthiana* Schinz

Vernacular/common names: marula (trade name); hameid (Arabic); gna (Chad); mu-mugga (Ghana); maroela, mufula (South Africa); umganu (Swaziland); mupfura (Zimbabwe); mng´ong´o (Swahili).

Subspecies/Varieties: *Sclerocarya birrea* subsp. *birrea*; *Sclerocarya birrea* subsp. *caffra* (Sond.) Kokwaro; *Sclerocarya birrea* subsp. *multifoliata* (Engl.) Kokwaro

Distribution and habitat

Native to Africa where it is widely distributed between 16°N and 20°S in wooded grasslands, riverine woodlands and bushlands. It prefers well drained sandy soils and loams but is often found growing on rocky hills. Occurs at low to medium altitudes in areas with 200-1600 mm rain per year. Subsp. caffra is known to be highly salt tolerant.

The species has been introduced to Israel where it was successfully established in the Negev Desert.

Uses

The marula is a valued fruit tree and all parts of the fruit are edible. The juicy pulp is rich in vitamin C. It is used in jams and jellies and, on a commercial basis, to produce marula beer and liqueurs like, in South Africa, Amarula. The seeds have a high oil content (~60%), consisting mainly of unsaturated fatty acids, and are also rich in protein and minerals. They are eaten raw or cooked.

The bark is widely used in the treatment of dysentery and diarrhoea due to its high antibacterial activity. The wood is used for carvings and fuel, fibres from the inner bark for making rope, fruits and leaves are a source of fodder and the tree provides shade and acts as a wind break.

Botanical description

Tree, normally about 10 m tall, on favourable sites up to 20 m. Bark grey, flaking in patches exposing the underlying light yellow tissue.

Leaves alternate, compound, with 7-13 pairs of opposite leaflets plus the terminal leaflet. Leaflets are dark green above, much paler and bluish-green below. The leaves are crowded near the ends of branches. The species is principally dioecious with male and female flowers on different trees, but occasionally a tree can bear flowers of both sexes. Flowers in 5-8 cm long inflorescences at the end of branches.

Fruit and seed description

Fruit: a round drupe, up to 3.5 cm in diameter, yellow at maturity. The pulp is juicy and adheres tightly to the stone. The stone is 2-3 cm long, hard, with one to four cavities, each usually containing one seed. Each cavity has an opening covered with a lid (operculum) that remains firmly attached until germination.

Seed: the seeds are small and fragile, covered with a thin seed coat. 500 stones per kg. has been reported.

Tree habit. Botswana. Photo: Roeland Kindt, University of Gent

Flowering and fruiting habit

The trees are deciduous, standing bare for several months during the dry season. Flowering occurs at the end of the dry season just before the leaves appear and the fruits mature at the beginning of the rainy season. In the Sahel flowering occurs in January-March, fruiting in March-April; in the Sudan flowering is in January-April, fruiting in April-June;

in southern Africa flowering is in September-November, fruiting in February-June.

The fruits abscise before they are mature. At the time of fruitfall the fruits are still green and firm and final ripening takes place on the ground.Trees can begin to set seed as early as at the age of 5 years.

Harvest

When the fruits have turned yellow they are mature. At this stage they have already been abscised, so fruits are normally collected from the ground.

When mature, the seeds have a high moisture content, up to 30% and to avoid fermentation of the pulp the fruits must be brought to the processing site as soon as possible.

Fruit and seed processing and handling

After collection it is vital that the seeds are processed and dried as soon as possible. If the seeds are kept at initial moisture content for just a few days they will loose viability.

Before depulping, the fruits are soaked in water for 24 hours. The fleshy pulp can then be removed using a cement mixer. The fruits are mixed with gravel in the proportion of 1 kg gravel to 2 kg fruits. With a large amount of water, this is stirred in the mixer. When the stones are clean, they are separated from pulp and gravel and washed clean with water. After extraction, the stones are spread out on a mesh and dried in the sun for at least two days.

Storage and viability

The seeds are orthodox, they can withstand substantial water loss and low storage temperatures. If dried below 10% moisture content they can retain viability for up to 4 years.

Dormancy and pretreatment

The hard endocarp (stone) forms a physical barrier to seed germination and removal of the opercula (lids) will significantly improve germination and the seeds will germinate faster and more uniformly. This must be done manually with a small chisel and is normally too time consuming to be feasible.

Germination has also been reported to be improved if the stones are cracked in a vice but this must be done carefully as the seeds are very fragile and easily damaged. Furthermore, cracking may increase seed microflora. It is not recommended to extract the seeds. Treatment with acid has shown good results.

There are some indications that the seeds need after-ripening, in some seedlots it was observed that germination improved after the seeds had been stored for 3-6 months. However, this may also have been the result of loosening the operculum over time.

Sowing and germination

Germination is epigeal. If the opercula have been removed, germination is fast and uniform, reaching 70% after one week and 85% after two weeks from sowing. Without treatment, germination may take as long as nine months. Vegetative propagation with cuttings has proven successful.

Mature fruits of *S. birrea* subsp. *caffra*, Botswana. Photo: F.E.M. Cook

Stone with opercula removed to facilitate germination. Photo: Andrew McRobb (copyright Royal Botanic Gardens, Kew, with permission)

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