



agriculture,  
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# Marula

— Production guideline —

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## GENERAL

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### Classification

Scientific name: *Sclerocarya birrea*  
Family: Anacardiaceae  
Common name: Marula (English), Maroela (Afrikaans), UmGanu (isi-Zulu), Nkanyi (Xitsonga), Morula (Sepedi), Mufula (Tshivenda).

### Origin and distribution

The distribution of the marula throughout Africa has followed the Bantu in their migrations, as it has been an important item in their diet since time immemorial. This species is native to the following countries: South Africa, Malawi, Namibia, Niger, Botswana, Gambia, Zambia, Zimbabwe, Sudan, Swaziland, the Democratic Republic of Congo, Ethiopia, Kenya, Tanzania (including Zanzibar), Angola and Uganda.

Marula is also present in Madagascar (possibly introduced) and has been introduced into Mauritius and Reunion. It has been grown as an experimental crop in Israel and has been introduced into Australia and India.



## Production levels

### *South Africa*

The marula tree is found widely distributed in many South African game parks and in the rural areas of Limpopo, KwaZulu-Natal, the Eastern Cape and Mpumalanga. It is more dominant in Phalaborwa in the Limpopo Province and Mpumalanga. As a prolific fruit bearer, one single tree can produce up to 500 kg of fruit per year.

### *Internationally*

The tree is grown worldwide and has been valuable to millions of people, particularly in Central and East Africa, for thousands of years. It is also grown in parts of Asia, Europe and America and has been introduced into Australia. Average crop yields are about 30 kg per tree, although large trees can bear heavily, up to 70 000 fruit on a single tree.

## Major production areas

It is more dominant in Phalaborwa in Limpopo Province and Mpumalanga.

## Description of the plant

The marula is a medium to large tree, usually 9 m tall, but it can grow up to 18 m. It is single-stemmed, with a dense, spreading crown and deciduous foliage.



### *Mature plant*

**Stem and bark:** The old stems are silver-grey in colour and fairly smooth. The bark peels off in disc-shaped flakes, giving the trunk a mottled appearance. The interior bark is red or pink with darker stripes.

**Leaves:** The leaves are petiole and occur in three to eight opposite pairs of leaflets and a terminal one, 30–100 × 15–40 mm toothed margins. The leaves have sharply pointed leaflets.





*Flowers:* Flowers are arranged in a bunch, 5 to 8 cm long. Female and male flowers are separated, whether on the same tree or on different trees. The small flowers are pinkish-red in colour.

*Fruit:* The plum-sized fruit is thick, very juicy and aromatic. When ripe, the fruit has a light yellow skin, with white, succulent flesh and a strong, distinctive and turpentine flavour.

*Stone and kernel:* The stone is walnut-sized and has a thick wall; the flesh clings onto its brown stone and is very fibrous and juicy. The ripe fruit has a characteristic turpentine flavour. Inside the woody stone are two to three oblong kernels. Each kernel is protected by a small bony "lid", which becomes detached when the stone is cracked.

#### *Essential parts*

The most important parts are the fruit, nuts, bark, leaves and stem.

## Climatic requirements

### *Temperature*

The marula tree is highly sensitive to frost and grows best in frost-free areas under warm conditions. It is adapted to dry and hot weather conditions.

### *Water*

The tree occurs naturally and is usually rainfed. It is found in arid and semi-arid areas with summer rainfall varying from 250 to 1 000 mm. In South Africa the plant is best suited to the 250 to 800 mm rainfall zone.

## Soil requirements

It is an indigenous tree adapted to poor soils. It occurs naturally in various types of woodland, on sandy soil or, occasionally, on sandy loam.

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## CULTIVATION PRACTICES

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### Propagation

The marula tree can easily be propagated by seed. It can also be propagated by cuttings and grafting. Vegetative propagation is essential for reproduction of plant material so that the offspring will contain the exact characteristics of the parent material with regard to genotype and health status.

### *Seeds*

The marula tree is a prolific seed bearer and matured fruit falls when still green and turns yellow on the ground. Marula is very easy to grow from seeds, provided these are treated in the right way. Seed should be collected from fallen, ripened fruit and be soaked overnight in warm water before sowing. After soaking, place the seeds on damp, fluffy peat moss at room temperature for about a week or two. This softens the plugs found at the broad end—usually two per seed, sometimes one. The broad end should carefully be pared down with secateurs until the outline of the plug is visible.

Then, using a small pocket knife carefully inserted into the plug outline, gently lever out the plug—a vice may be needed to do this. Once this is done, the seed should be placed on the peat moss and kept moist at 25

to 30 °C. Plant the seed directly into a black nursery bag filled with river sand and keep in the shade until seedling appears. The root grows quickly and as long as the weather is warm, the sprouted seed may be planted. Insert the root into the soil and just barely cover the seed. Do not allow it to get too wet or too cold, use a fungicide, and if the weather is cold, bring it inside. Often more than one plant emerges from the same nut, but all except one plant should be removed. It can be grown directly in the soil. If raised in a nursery or taken as wilding the transplanting should be done while the plant is still small. A good size is when the plant has only two leaves. Transplanting of bigger seedlings is difficult without damaging the root and slowing down the growth of plant. A seedling population tends to consist predominately of male trees.

### *Cutting*

Marula can also be propagated by means of shoot cuttings. Even though cutting is a propagation method, marula are not usually propagated by this method because of the resulting poor root system. The best time for taking cuttings is from September to March when the trees are actively growing. Any type of actively growing wood can be utilised as long as actively growing leaves are present. Cuttings of about 10 to 15 cm in diameter, 2 m in length are planted at a depth of 1 m (Roodt 1988). The trees can be coppiced, regenerating rapidly, and normally farmers plant them closer together and trim the top and sides. Depending on the length of the internodes, cuttings can be shortened to one node in the rooting medium. Marula is a fast-growing plant and fairly drought-resistant, reaching 3,5 m in eight years on the 600 mm mean annual rainfall isohyet. Truncheons of 100 to 150 mm in diameter and 2 m long can be planted in early spring.

### *Grafting*

This technique is used to unite “parts” of different plants by bringing the cambium of each into contact and creating a situation in which the cut surface can unite and grow together. Marula trees can also be propagated successfully by means of grafting. Rootstocks must be grown in advance from seed for later grafting. Seedling trees can be grafted when they reach 20 cm and about pencil size. Graft wood of the same thickness as the rootstock is selected and the buds must be swollen. The slanted cut on the graft wood and that of the rootstock must fit together neatly and the cambium layer should overlap on at least one side. The graft wounds are firmly tied with PVC grafting strip. The entire piece of graft wood is then covered with the plastic strip or parafilm to prevent desiccation. Grafted trees have a better root system than trees developed from, for example, air-layering. It

is this piece (the scion) that bears the gene of a desirable fruit tree. Grafted trees are usually shorter and bear fruit from the third to the fifth year while seedling trees usually bear fruit in five to seven years.

### **Soil preparation**

Seeds should be placed on damp, fluffy peat moss at room temperature from about a week or two. The tree can be grown from a truncheon planted in early spring. Plant it in full sunlight and create some kind of wind-break, e.g. buildings or other trees. Dig a hole much larger and deeper than the container which the young grafted tree is growing in. Use one part compost to two parts soil. Remove the young plant from the container or mulch bag. It should be noted that loosening and amending the soil with organic material will encourage deeper rooting because oxygen and water can penetrate the soil more deeply. Plant the tree and firm the dry soil as you add it to the hole. Create a water basin and water immediately. Add organic mulch or compost to the topsoil but keep it away from the young tree bark to avoid burning.

### **Fertilisation**

The quantity of fertiliser used depends on the age of the tree, its health and bearing. Nursery medium recommendations are a 3:1:1 or 1:1:1 mixture of coarse sand and manure and well-drained, sandy loam.

### **Irrigation**

Whether you will water every two or every three days depends on the season and soil type. Matured trees need periodical watering, especially if they are growing in a sandy soil or if there has been no rain.

### **Pest and disease control**

Little is known regarding the diseases of marula or even fungi that occur on this tree. The most important pests affecting the plant are the marula fruit-fly, the red marula caterpillar and the marula beetle. Early removal and destruction of fruit-flies is recommended.

A wide range of pesticides are available for use in orchard and, if found necessary, will require precise advice. Baits can also be used to attract male flies to containers with pesticides to reduce the fruit-fly population.

## Harvesting

### *Harvest maturity*

The trees produce flowers from September to November and bear fruit from January to March. In the middle of the rainy season (February to March) the marula fruit begins to drop from the trees in large quantities. The fruit is then pale green and ripens on the ground to a pale, waxy yellow colour around January to March or April.

### *Harvesting methods*

The ripe fruit is normally collected from the ground by hand. Any fruit that is picked off the tree will be rejected to ensure the sustainability of the product. A strict policy guiding the treatment and harvesting of marula trees and fruit is in force in the Limpopo Province.

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## POST-HARVEST HANDLING

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The fruit will go through the process of hand washing once it has been gathered. Then it will be peeled to be made into fruit pulp. Better handling of the fruit during processing allows for higher brix levels, which contribute to the saleability of the fruit pulp.

### **Oil production process/decortication**

This is a process of extracting the kernels from the nuts once the fruit part has been separated from the nut. To get quality oil, marula are processed by basic hand-pressing and filtration techniques and no solvents are used. One can also improve quality by refining the oil, which makes it more suitable for cosmetic application.

### **Pulping process**

- The fruit is selected on a sorting conveyor belt.
- It then goes through washing process before reaching the de-stoning tank.
- In the de-stoning tank, the rotating blades remove the fruit's flesh from the hard kernels.
- The pulp is pumped into stainless steel cooling tanks where it is kept at a consistent temperature of below 8 °C.

- The pulp is then transported to the Distell Cellar in Stellenbosch.
- At the Cellar, it is transferred to fermentation tanks and pure yeast culture is inoculated into the pulp.
- During fermentation, the natural fruit sugar in the marula fruit is converted to alcohol.
- Once the marula wine has been fermented, the clear wine is transferred to the distillery.
- Without adding any preservatives, the marula wine is distilled through a column still.
- A second distillation in copper pot stills enables the further concentration of marula flavours.
- The spirit is then wood-matured for two years in small French oak barrels.
- After two years of maturation, the marula'spirit is blended with the finest cream and is ready to be bottled, labelled and shelved.

### Marketing

Marula is the source material of popular South African liquor, one of the largest single export earners, and marula beer is sold throughout the season in Mpumalanga, along national routes through Mpumalanga and at taxi ranks. The limited shelf life of marula beer prevents its market expansion, or even export, although there are a few commercial processors who rely on local collection for supply.

There are also cooperatives developing in the Limpopo Province that are processing the marula fruit for jam, jelly, salad dressing and achar.

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## PRODUCTION SCHEDULES

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Activities	January	February	March	April	May	June	July	August	September	October	November	December
Planting												
Harvesting												
Marketing												



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## UTILISATION

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Fresh, ripe fruit is edible and is used to make beer. Marula has a truly delicious nut which can be eaten raw or roasted and is rich in protein (28 %) and oil. The good-tasting oil is used for cooking and for products such as preservatives. Jelly, juice, salad dressing and jam can be made from the fruit.

The skin can be processed into glue, soap, ointment, achar and vinegar.

Cattle and wildlife eat the fruit and the leaves on the trees as well as on the ground. The leaves are nutritious and will contribute to a healthy diet for livestock. During extended drought periods when there is no grass the marula leaves serve as a fodder bank for livestock. The wood is used to make furniture and, to a lesser extent, panelling. It is also a popular wood for carvings and household articles. The bark can also be used to make a light-brown dye. The marula tree gives excellent shade in garden parks and streets.

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