-PRODUCTION GUIDELINE-

African Mangosteen

Garcinia livingstonei

agriculture,
forestry & fisheries

Department:
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PART I: GENERAL APECTS

Classification

Scientific name:	Garcinia livingstonei
Family:	Clusiaceae
Common names:	African mangosteen, Afrika-geelmelkhout, umPhimbi, UGobandlovu, Mmimbi, mokongono, mokononga, Imbe, motsoadi

Origin and distribution

Mangosteen originates in the Sunda Island (Brunei, East Timor, Indonesia and Malaysia) and the Moluccas or Spice Islands (Indonesia) in tropical Asia. Originally from Malaysia, it was spread to the Philippines, Burma and India and further to other parts of the world. The mangosteen plant was introduced in England in 1789, and shortly in the Pacific island and Antilles. Mangosteen was introduced in Sri Lanka in 1800. The mangosteen seedlings were introduced to Australia in 1854, after that it was found throughout the tropics. The tree is widespread in the warmer parts of Africa, from just north of Durban to as far as Somalia and Guinea. In southern Africa it spreads quite far up the Limpopo and Zambezi Valleys.

Production levels

South Africa

The only species indigenous to South Africa is Garcinia gerrardii. The fact that African mangosteen appear regularly on the Botanical Society plant sale in Durban provide evidence of its availability as small trees from nurseries in that area. The tree is protected in South Africa and it is National Tree List no 486. Little is currently known about how to grow this plant as a food crop. Despite common occurrence and widespread popularity, its production under cultivated conditions remains basically undocumented. The fruit has a thin skin and subsequent susceptibility to damage that might be attributed to its hindered commercial cultivation.

Internationally

Most of the commercial production occurs in Southeast Asia (mostly Indonesia, Mayaysia, the Phillipines and Thailand) and few locations in America (Mainly Costa Rica, Honduras, Panama, Peru, Colombia, Brazil, Hawaii and Puerto Rico) and Australia. Thailand is the major producer and exporter of mangosteen.

Major growing areas in South Africa

There is no documentation on major growing areas; however, the literature reported that the KwaZulu-Natal, Limpopo, Mpumalanga and Eastern Cape people use it for traditional medicinal purposes. In many cities of South Africa, plants of this fruit are sold by nurseries.

Description of the plant

Matured plant

The mangosteen tree is a very slow-growing, erect, ever green plant that can grow up to 6 to 25 m in height. The tree is pyramidal when young but later spreads into thick, woody young branches that bear yellow to red resin.

Stem

The stem is dark-brown or nearly black with flaking bark with the inner bark containing concentrated yellow, sticky, bitter latex.

Bark

Old bark is dark-grey, but the overall impression is of a light yellow-grey. The bark is divided into small, regular sections.

Leaves

Mangosteen leaves are usually three in a whorl (may be four or opposite), variable in shape. They are usually egg-or lanced-shaped, generally 60 to 110x 30 to 55 mm, blue-green with whitish, waxy veins.

Flowers

Flowers appear in groups of 5 to 15 in leaf axils on old wood, greenish, whitish or yellow, scented, male and bisexual flowers of different structures. Male

flowers resemble pincushions and bisexual flowers are green with shiny ovaries. Flowers occur from August to November.

Picture 1: African mangosteen flowers

Fruit

The fruit is an orange berry, 10 to 40 mm in diameter, with yellow orange sticky juice, pleasant, and sweet to acid on the taste buds. The skin is thin, smooth, glossy and leathery tough, which separates easily from the flesh.The unripe pulp can contain latex. The fruit usually contains one or sometimes two seeds. Fruiting occurs from November to February.

Picture 2: African mangosteen peel

Seed

The seed is enclosed in a hard coat, well suited for protecting the delicate embryo.

Varieties

There are some varieties that have smaller seeds and more edible pulp, but no named varieties or selections are available at local nurseries. Superior varieties can be grafted onto seedling rootstocks and this is the method most people use to get earlier fruiting.

Climatic requirements

Temperature

Mangosteen requires a tropical climate; it grows well in warm, humid environment. Seeds germinate best at temperature near 25 °C with enough soil moisture. The optimum temperature is 25 °C to 35 °C with a relative humidity at or above 80 %. Mangosteen cannot tolerate temperature below 5 °C whilst a temperature of less than 20 °C slows down growth. The tree is notably sensitive to cold, though quite hardy to both drought and heavy rain. In lowveld as far as south KwaZulu-Natal, it typically occurs where mean annual temperature is 20 to 22,5 0C and frost never occurs.

Rainfall

The tree is drought resistant and may find use in efforts to combat early stages of desertification. Ideally, mangosteen grow well in a well distributed rainfall throughout the year with an annual rain of 1000 to 1200 mm. Dry periods of more than 15 days can have a negative impact on yield. It tolerates dry seasons of as long as five months with ease.

Soil requirements

Trees are found on sandy or dry rocky sites as well as in coastal areas. Soils vary from deep sands to heavily alluvial soils along riverbanks. Mangosteen prefers deep, good drainage, porous soils rich in organic and nutrients, especially sandy loam or clay containing course material. Sandy alluvial soils are unsuitable and sand low in humus contribute to low yields. The plants do not grow well in soil that has high pH, however, they do well in slightly acidic soil. Alkaline soils may develop nutritional deficiencies, particularly in zinc.

PART II: CULTIVATION PRACTICES

Propagation

Trees are easily propagated by seed, but because of the slow growth, often is less than a foot high even after one year's growth. It usually takes five to six years to reach fruiting age.

Soil preparation

When establishing a mangosteen orchard, land should be prepared by deep plowing once and then done again later, followed by several harrowing, until the soil is well tilth. Wooden poles are then placed at a distance recommended for planting mangosteen plants. Holes are then dug at the positions occupied by the wooden poles where mangosteen seedlings are to be transplanted.

Planting

Planting is usually done at the beginning of rainy season. A hole needs to be at least two metres long. Put a flyer off broken bricks in the bottom and a pipe in one corner. Put a rich mixture of topsoil, compost and a little fertiliser on top of the bricks, and back-fill the hole so that the poorest soil is on top. Put down the hose pipe and water the hole until the top of the soil is saturated. When the top subsides, an hour or so after the soaking, you can plant your tree and make the good subsistence in the hole with more subsoil or mulching. Water the pipe from below via the pipe once a week. The seeds germinate readily (almost 100 %) if they are fresh and are kept moist and warm.

Mangosteen seedlings are transplanted to the field when they are two years old at a height of about 25 to 30 cm tall. The seedlings are carefully removed from the containers and set into the prepared holes of 0,6m x 0,6m x 0,6m, filed with farm manure and top loose soil. If the orchard is established on a level land the trees should be planted using a square system of 8m x 8m between the rows and plants. The seeds may start to germinate as soon as they are detached from the fruit if maintained in a moist condition. The seeds are grown in seed boxes, seed pots or plastic bags under a shade condition. The seeds sprout in one or two weeks and must be watered three to four times a week. The seedling grow very slow taking up to two years before the seedling can be transplanted and only about 2 m in six years. The percentage of seed germination is directly related to the weight of the seed, fully developed seeds should be chosen for planting.

Fertilisation

Trees should be fertilised every three to four months with a complete fruit tree fertiliser. If you have young trees or container plants, these can be fertilised every other month to help speed their slow growth.

Irrigation

Irrigation is very important during dry months. Plants should be watered as soon as they are transplanted and water must be kept at field capacity, however, standing water over the roots can kill the plant. Older trees can survive and even thrive in regions where their roots are covered with water most of the year.

Weed control

Weeds can either be controlled by weed slash, hand hoe or application of herbicide. Slash weeds around the plant and combine with mulching which keeps the soil moist and prevent the germination of weeds. With the use of herbicides, avoid spraying the trees.

Pest and diseases control

There are few pests of diseases of G. livingstonei; however, during the period of fruit ripening, fruit flies may become a problem in some years. The wood is susceptible to borers

Leaf caterpillar

Larval stage feeds on young leaves and shoots. These pests affect the trees at a young stage and in high populated case the caterpillar may eat all the leaves and the tree, in most cases, dies-off. Application of registered insecticide at an interval of two weeks may control these insects.

Leaf miner

Leaf miner larvae feed on young shoots. The larvae tunnels in the epidermis, causing the tree to die. These can be controlled by registered insecticides that contain Bacillus thuringiensis.

Fruit borer

Larvae burrow into the fruit from mature to ripe stage. The borer feeds into mesocarp, aril and seeds. Larvae move out of the fruit and pupate into the soil to become beetle. These can be controlled by destroying all the affected fruits.

Stem canker

The disease infects branches and stems. The leaves of the infected trees wilt and drop; causing the tree to die-off. Infected trees can be controlled by eradication and burned to stop the spread of the disease.

Sooty mould

The disease affects the branches, which causes the leaves to wilt. Affected branches turn reddish in colour. These can be controlled by improving aeration and sunlight penetration; this can be done by pruning overlapping branches.

Harvesting

Ripeness is gauged by the full development of colour and slight softening of the mangosteen fruit. Harvesting may be done when the mangosteen fruits are slightly under-ripe; however, they must be fully mature or they will not ripen after picking. The mangosteen fruit must be picked by hand or by means of a cutting pole and must not be allowed to fall and bruise.

PART III: POST HARVEST HANDLING

Little is known about handling African mangosteen. The rather tender skin would seem to limit the possibility of shipping imbes long distances, but so many other fragile fruit are routinely transported acoss the oceans these days so it may be less of a limitation.

Sorting and grading

After picking, fruit are cleaned and graded according to the weight of each fruit and appearance of the skin.

Packing

Fruit are packed according to uniform quality red fruit. The fruit must be wrapped in tissue paper in a single layer and packed in boxes in wooden crates.

Storage

Ripe mangosteens can be kept for 3 to 4 weeks in storage at 4,44 to 12,78 ° C. However, the optimum conditions for cold storage temperatures of 3,89 to 5,56 ° C with a relative humidity of 85 to 90 % can maintain the fruit quality for up to 49 days.

Marketing

Mangosteen must be marketed as fresh fruit soon after picking.

PART IV: UTILISATION

Mangosteen fruit is consumed fresh. It can also be canned, frozen or processed into juice, jam preserve and syrup. The fruit can also be cooked with porridge and other cereal products. Once the seeds are removed, the flesh can be sundried and stored like a pitted prune. Fermented beverages are prepared by soaking the fruits in alcohol and thickening the extract with syrup. The powdered root is used as an aphrodisiac. The tree can also be used as a hedge. Many Maputo streets are lined with the trees providing shade and fruits and also beautifying the landscape around the famous Victoria Falls.

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