



Agroforestry Facts Nugge



Botanical Name	<i>Moringa oleifera</i> Lam.
Name in English	Drumstick
Name in Kannada	Nugge
Family	Moringaceae
Seeds Collection	Seeds should be collected from well-developed pods, but difficulties arise because seeds drop continually.
Seeds Processing & Treatment	Seed storage behaviour is orthodox; viability can be maintained for several years in hermetic storage at 3 °C with 5-8% moisture content.
Nursery	It is easily established by cuttings or by seeds. Seeds can be sown either directly or in containers. No seed pretreatment is required and seeds sprout readily in 1-2 weeks.
Plantation Management	<i>Moringa oleifera</i> is a small, graceful, deciduous tree with sparse foliage, often resembling a leguminous species at a distance, especially when in flower, but immediately recognized when in fruit. The tree grows to 8 m high and 60 cm dbh. Bole crooked, often forked from near the base. Bark smooth, dark grey; slash thin, yellowish. Twigs and shoots shortly but densely hairy. Crown wide, open, typically



umbrella shaped and usually a single stem; often deep rooted. The wood is soft.

Readily colonizes stream banks and savannah areas where the soils are well drained and the water table remains fairly high all the year round. It is quite drought tolerant but yields much less foliage where it is continuously under water stress. It is not harmed by frost, but can be killed back to ground level by a freeze. It quickly sends out new growth from the trunk when cut, or from the ground when frozen.

Moringa is an extremely fast-growing tree, and within 1-3 months trees reach 2.5 m. Constant pruning of up to 1.5 m/year is suggested to obtain a thick-limbed and multibranching shrub. Trees are commonly grown for their leaves, and topping-out is useful to keep an abundant supply of leaves, pods and flowers within easy reach. *M. oleifera* responds well to mulch, water and fertilizer. Growth is stunted in areas with a high water table. It coppices and pollards well.

Plants raised from seed produce fruit of unpredictable quality. Shield budding is successful, and budded trees begin to bear in 6 months and continue to give a good crop for 13 years. As it is essentially a vegetatively propagated crop, breeding methods like single-plant selection, mass selection and exploitation and maintenance of vigour are transgressive. Stem cuttings are usually preferred because they root easily. When grown for its roots, the seeds are sometimes planted in rows like vegetables.

the high yielding varieties are KM1, PKM1, PKM2, GKVK1, GKVK2, GKVK3, Dhanraj, Bhagya (KDM1), Konkan Ruchira, Anupama, and Rohit 1.

The field to be ploughed well once before cultivation. Pits are dug and allowed to weathering in sun for a few days.

Plant needs proper pruning in early stage, say when the plant attains a height of 2 meters, for better yield either of the leaves or pods. While using cuttings of plant select cutting from pest free tree. The cutting shall have length of one and half meters length and 5 cm diameter. The cutting should be kept in the soil for 1/3rd portion for better root formation.

Moringa does not require a lot of fertilizers. Basic nutrients are just about enough for its survival. The application of fertilizers could be beneficial to increase the weight of the pods or foliage when necessary. Usually, an application of 50 KG Urea, 50 KG Potash, and 50 KG Phosphorus is all that's needed per hectare for good growth of Moringa plants

Weed control is essential in Moringa cultivation regularly. Annual pruning of the trees will result in weeds around the



	area and keeping the area clean is essential for healthy moringa plants. Regular weeding can be practiced manually
Model/Spacing	2 x 2.5 meters for normal planting. 1.5 x 1.5 meter for high density planting. 0.6 meters x 1 meter for cultivation of leaves.
Pests, diseases and Management	The hairy caterpillars are one of the most common pests in moringa plants. The application of carbaryl or FORS in the right proportion should keep control of these pests. Also, light traps right after monsoon could prevent the infestation of these worms. Moringa is a fairly immune plant to most diseases but there are times when moringa is affected, especially due to seasonal changes. 12 notable diseases are found in moringa including canker, root rot, and Leaf spots among others
Plant Rotation	Since the plants take time to grow and start yielding, inter cropping with short duration vegetables is beneficial. The cropping pattern for Drumstick is annual as well as perennial. In annual pattern, the plants are recultivated after two yields, whereas in perennial cultivation such as in rain fed areas, the plant is kept for periods up to five or six years, following due pruning practices.
Yield	Under good cultivation, a drumstick plantation can yield 18 to 20 tonnes of pods per acre per year and 25 to 32 tonnes of fresh leaves per acre in a year.
Uses	The leaves, a good source of protein, vitamins A, B and C and minerals such as calcium and iron, are used as a spinach equivalent. They are an excellent source of the sulphur-containing amino acids methionine and cystine, which are often in short supply. Young plants are eaten as a tender vegetable and the taproots as an alternative for horseradish. Young pods are edible and reportedly have a taste reminiscent of asparagus. The green peas and surrounding white material can be removed from larger pods and cooked in various ways. Seeds from mature pods (which can be 40-50 cm long) can be browned in a skillet, mashed and placed in boiling water, which causes an excellent cooking or lubricating oil to float to the surface. The pleasantly flavoured edible oil, resembling olive oil, is an excellent salad oil. The flowers can be eaten or used to make a tea. Seeds are effective against skin-infecting bacteria <i>Staphylococcus aureus</i> and <i>Pseudomonas aeruginosa</i> . They contain the potent antibiotic and fungicide terygosperrin. The alkaloid spirachin (a nerve paralyzant) has been found in the roots. Even when free of bark, the condiment in excess may be harmful. A decoction of the flowers is used as a cold remedy. The gum is diuretic, astringent and abortifacient and is used against asthma. Oil of Ben is used for hysteria, scurvy,



	<p>prostate problems and bladder troubles. The roots and bark are used for cardiac and circulatory problems, as a tonic and for inflammation. The bark is an appetizer and digestive. The iron content of the leaves is high, and they are reportedly prescribed for anaemia in the Philippines.</p>
Buyers /Industries	<p>The market for Moringa is always during the off-season. Moringa pods or drumsticks can cost up to 250 Rs per kilo during the off-season while it can drop to 5 rupees per KG during peak season. Also, the area plays a major role in the price. While Kerala sells drumsticks for 30 Rupees a Kilo, the neighboring state of Tamil Nadu sells the same product for Rupees 5 during peak season. Metros and northern states demand a higher price in the market than rural areas.</p>
Harvesting	<p>After 6 months of 'planting, harvesting it can be done. On average 200 fruits could be obtained. After harvesting, the pruning of plants is done to get more branches and fruits in the next season.</p> <p>From the vegetative propagation tall plants are obtained. Therefore, after harvesting, branches have to be axed. Initially, about 90 fruits per plant are obtained but with the passage of times about 800 – 1000 DS are obtained / plant.</p>
Economic Returns	<p>When it comes to moringa plantation the profits are based on how much yield you get during the off-season. With normal production, you can expect around 50 KG of moringa pods per year from one tree. With an average cost of 10 Rs, you are looking at a meager 50,000 Rs per acre. With off-season production of approximately 10 KG per plant, your total yield would be 150-200 Rs per KG, and that's 1500 Rs per plant</p>
Current Market Rate	<p>A kg seeds costs Rs. 3,500</p>