



# Innovations developed in *Moringa Oleifera* (Drumstick tree, horseradish tree) propagation for enhancing nursery income in Tamil Nadu, India

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## Summary

This practice describes how moringa plant can be propagated by air layering to promote vegetative propagation of trees and produce seedlings. Farmers nowadays might prefer propagation of moringa through air-layered cuttings rather than through seed propagation because through vegetative propagation the air layered seedlings represent the characteristics of selected mother trees better. Seeds, if sown in a usual way, do not show the character of mother trees that well. High yielding varieties of selected mother trees can be propagated in a better way using propagation through air-layered cuttings.

## Description

### 1. The drumstick tree (*moringa oleifera*)

The drumstick tree or horseradish tree is referred to as *moringa oleifera*, the most common known among around 13 species of moringa trees in the family of *Moringaceae*. The species is native to the Indian subcontinent and parts of Africa and many parts, like the bark, the leaves and the seeds have ever since been widely used for a wide range of purposes. The nutritional content

of the tree is said to be very high in form of Vitamin A, B and C and mineral content. Also, there is proof that moringa consists of sulphur containing amino acids. Scientific research and various projects have shown that moringa is a very effective means for treating malnutrition.

For those suffering nutritional / calcium deficiency, a local traditional practice is to take 330 g moringa leaves, 50 g cumin, 50 g black pepper, boil it in 1 litre of water for 10 minutes and use 100 ml for decoction daily. It is known for strengthening the body and the vitality. The local practice has shown that this can also be given to animals; 300 ml for cattle or 50 ml for small ruminants.

As a plant, moringa needs little water and poor soils, so that it predominantly grows in arid and semi-arid regions throughout the tropics. The tree can be cultivated within agroforestry systems as well as in plantations.

### 1.1 Moringa propagation by air-layering

Air layering is a technique followed in the production

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of ornamental plants and trees to promote vegetative propagation of trees and produce seedlings.

Usually in a branch or stalk of the tree (with pencil thickness) air layering is made in a single place at the stem. This is repeated around five times a year. During winter / rainy season (May - September) the air layers take more than a month for root formation. To let the root of the seedling develop properly, the rooted layers are removed from the air-layered branch and are planted in nursery bags filled with mixed soil substrate. Thus, the layers develop into a seedling. Then it takes about two to three months to establish grown up seedlings. Just then, the seedlings are ready for sale or for being planted in the main field for moringa production. Also, in an agroforestry system along with other crops moringa is commonly planted.

After planting in the main field the seedling starts bearing fruits from six months onwards until 10 to 15 years of age. Compared with bred annual moringa varieties the rooted air layer seedlings are perennial (lasting longer than a year, or one growing season). The perennial type does not have to be replanted after a harvest, thus contributing to long-term yield of the Moringa farmer. There are existing moringa varieties in Tamil Nadu which are high yielding but they are of the annual type and after the harvest the farmer generally has to take up fresh plantings again.

## 2. Double layering method for moringa propagation

Usually, in a branch or stalk of the tree (with pencil thickness), air layering is made in a single place. For improving the efficiency of vegetative propagation however, the air layering method has been adopted to

produce several air-layered seedlings on a branch.

By the double air layering method about 10 to 12 air layers can be made at a time. It is repeated five times in a year or on a monthly basis.

### 2.1 How to make a double air-layer

- The bark (2.5 cm length) of the selected branches of the mother tree are removed. Panchakavya soaked coir pith is placed over this portion and then covered with a polythene sheet. Both ends of the polythene sheet have to be tied with cotton thread.
- Root growth is seen 20 days after layering. Then the rooted air layers are separated from the mother tree some 25 to 40 days later. The polythene sheet is removed and the layers are planted into the polythene bag for further root formation. This bag contains a mixture of sand, red soil and farm yard manure.
- The polythene bags are placed in the nursery area for 20 days. After that, the air layers are ready for planting.

Figure 1. Farmer showing a branch with two air layers (double-layer)



### 2.2 Double planting in a single pit

Usually moringa seedlings are planted at about 6 meter distance. In each pit one seedling is planted. The double planting helps to use the land, soil and water in a more efficient way.



- The seedlings are planted in pits of 30 cm (1 ft.) diameter and 30 cm (1 ft.) depth.
- In order to conduct double planting, two adjacent pits with the same diameter and depth are dug, at about 60 cm distance to each other.
- The pits are filled with soil mixed with compost. Additionally, azospirillum (100 g), phosphobacterium (50 g) and neemcake (50 g) can be added.
- After grown up, the single tree is prone to damage by winds. Due to the intertwining of branches, the trees planted in a double pit not only withstand heavy wind speed better. They also lead to an increased number of pods of drumstick per acre (hectare), due to enhanced cross-pollination by wind. Pollen are able to spread better and reach other flowers, as the trees are closer.

After planting in the main field the seedlings of the perennial moringa type start bearing fruits from 6 months onwards until 10 to 15 years of age.

Figure 2. Double seedlings in a single pit with farmer Pallapapatti village, Dindigul district, Tamil Nadu



### 2.3 Advantage of double planting in a single pit

- The double air-layering method increases the number of layers in a given time per tree. Annually 60 to 70 rooted cuttings

can be produced in the new method in a tree compared to about 40 cuttings in the conventional system. The income is enhanced by at least 60 percent.

- There are 40 to 50 side branches in each tree and they support each other by intertwining each other. This partially prevents lodging due to heavy winds.
- The watering and manuring cost per tree is less in the double planting method, as it takes care of two trees at a time. Water and fertilizer use is more efficient. The overall cost of watering and manure is higher though, because more water and manure have to be applied to raise the saplings.

Figure 3. Air-layering technique practiced by women in Pallapatti village



### 3. Validation of the practice

More than 300 farmers in several districts in Tamil Nadu (Madurai district, Dindigul district) practice this method of double planting of seedlings. They increased the yield of pods from 20 to 30 tonnes per acre of moringa plantation (corresponds to 50 to 75 tonnes per hectare).

The 300 farmers gave good feedback on this technique. They procured the seedlings from the presented nursery and adopted the new technique of double seedlings in a single pit at 6 m (20 ft.) distance; in a row two adjacent



pits are dug at about 60 cm spacing at every 6 m distance.

#### **4. Agro-ecological zones**

- Tropics, warm