

Enhancement of Farmers Income Through Tree Mulberry Cultivation

¹Hadimani D. K., ²Vikram Simha H.V. and ¹Mallinath

¹Directorate of Extension, University of Agricultural Sciences, Raichur, Karnataka, India

²Assistant Professor, College of Agriculture, Ambalavayal, Wayanad, KAU, Kerala

*Corresponding Author: drdkhadimani@gmail.com

Mulberry is sole food of mulberry silkworms and 95 per cent of silk goods produced in the world are from mulberry origin. The major cost in silk production goes to mulberry leaves alone and is to the tune of 60 per cent of the total cost of production of silk. Hence, optimizing the cost of production of quality mulberry leaves is very much essential for profitability of sericulture enterprise. The mulberry leaf yield varies with variety, soil, climate, agronomic inputs and training methods. For sustained production of quality leaves with high productivity requires regular and periodical application of sufficient quality of organic manures and chemical fertilizers with irrigation input. In order to get higher tonnage of mulberry leaves per year per hectare on sustained basis mulberry derives nutrition from the soil and the same has to be replenished externally year after year. Mulberry is heavy feeder it requires huge quantity of organic manures (20-25 tons/ha/year) and chemical fertilizers and accordingly the leaf yield range from 40-65 tons per hectare per year. Under water scarcity conditions or less suitable soils for other crops tree mulberry is one of the options.

What is tree mulberry?

The mulberry plants which are allowed to grow tall with a crown height of 3 - 4 feet from the ground level having stem girth of 4 -5 inches or more is called tree mulberry. They are raised with 8 - 10 months old saplings with any of the varieties recommended for rain fed areas like S-13 (for red loamy soil) or S-34 (black cotton soil) which are tolerant to draught or soil moisture stress conditions.

The plantation is raised as block plantation with a spacing of 6 feet × 6 feet or 8 feet × 8 feet or 10 feet × 10 feet as plant to plant and row to row distance. The plants are usually pruned once in a year during monsoon (July - August) at a height of 3 - 4 feet from the ground level and allowed to grow with maximum of 8 - 10 shoots at crown. The leaf is harvested 3-4 times in a year by leaf picking method under rain fed or semi-arid conditions depending upon the monsoon.

Concept of tree plantation

Combining trees and field crops in arable lands is called as "agro-forestry". The objective of agro-forestry is to improve the productivity and

sustainability of land management system through introduction of woody perennials in herbaceous crop husbandry. Selection of tree species to be used in agro forestry must be based on cultural and economic as well as environmental and biological factors. Thus, growing mulberry as tree in highly eroded flat to gentle sloppy land unfit for growing arable crops, arable lands with soil fertility problems, degraded sloppy land can serve as one of the best means of agro-forestry.



Fig. 1 Two years old mulberry tree plantation

Who can grow tree mulberry?

Mulberry is a perennial plant with reasonably drought tolerance capacity. It can be cultivated as a trained tree by maintaining specific spacing between trees and crown height. This type of mulberry plantation is highly suitable for farmers of semi-arid / rain fed areas in plain land, hilly regions or in denuded lands unsuitable for agriculture. This form of cultivation is already been practiced in temperate and hilly regions. Of late, the concept of tree cultivation has also spread into the plains as a sustainable crop under severe water stress condition in waste and denuded lands. With the recommended packages, it is now possible to get about 6 - 8 MT of mulberry leaf yield per hectare per year through 3 - 4 harvests. It is also possible to take up appropriate inter crops in the tree mulberry plantation to reap higher economic benefits. Considering the above, mulberry can be cultivated under rain fed conditions with different systems of cultivation. These include;

(a) **Bush system of mulberry cultivation:** under protective irrigation.

(b) **Low-height tree type mulberry cultivation:** Suitable in hilly regions.

(c) Tree mulberry cultivation: Best suited to overcome acute water stress conditions.

Package of practices for mulberry tree plantation

Development of mulberry tree saplings

The mulberry saplings are developed in the nursery. A flat well drained loamy soil nearer to water source is ideal nursery site. The land must be ploughed or dug 30-40 cm deep and allowed for weathering in sun for 2 - 3 weeks. After tilling the land, root stocks, pebbles and weeds are removed and the land is brought to fine tilth with proper levelling. The land is divided into a number of smaller beds to prepare the nursery. A bed size of 6.0 m (L) × 1.2 m (B) accommodates 240 cuttings (row to row 30 cm and cutting to cutting in a row 10 cm distance) to raise 8-10 months old saplings. Each bed on all sides is separated by a bund of 25 to 30 cm width and height and provided with irrigation channel of 30 to 40 cm width and 15 to 20 cm depth. Each bed should be manured and mixed thoroughly with 5 pans of FYM / compost / vermicompost. In the case of clayey or black cotton soil, additional 5 pans of sand per bed should be mixed with soil uniformly. In the case of red loamy or sandy loam soils, there is a possibility of termite infestation. As a preventive measure, 0.1 % Chloropyriphos (5 ml per litre of water) can be drenched to nursery beds (2-3 litres per bed). Stem cuttings are prepared, treated with 1% Bavistin solution for 30 minutes and planted in the nursery. Mulberry cuttings sprout in 15-20 days and root initiation starts from 35-40 days onwards. Mulberry nursery is managed with regular weeding and watering for good growth and development of tree mulberry saplings.

For tree plantation, 8-10 months old saplings are uprooted from the nursery without damaging the roots by deep digging. It is advisable to irrigate the nursery beds thoroughly at least 2-3 days before uprooting to facilitate easy and complete removal of saplings with roots intact. The uprooted saplings are immediately planted in the main field after removal of leaf, top clipping and dipping the roots of the plants in 0.2 % solution of Dithane-M 45 to avoid fungal root rot disease.

Planting of saplings in the main field and establishment care

Flat or sloppy land either with red loamy or black cotton soil or denuded land not suitable for other agricultural crops may be selected for mulberry block plantation. Plantation can be taken up only during rainy season preferably in July - September or depending upon the onset of monsoon. The land should be thoroughly ploughed deep by tractor mould board plough depending upon the soil condition after

receipt of one or two pre monsoon shower. Once the land is made ready, farmyard manure / compost can be applied @ 10 MT/ ha and mixed with the soil. It is highly necessary to follow soil moisture conservation practice by raising wide bunds all along the four boundaries of the plantation to avoid runoff and allow rain water percolation in the planted area during monsoon. Before plantation, pits of the size of 35 cm (L) × 35 cm (B) × 35 cm (D) are dug at 8 or 10 feet apart from each other considering plant to plant and row to row distance as 8 or 10 feet × 8 or 10 feet. Each pit is then planted with 8-10 months old sapling exactly in the centre of the pit. To determine the centre of the pits and to keep the rows straight to avoid zigzag plantation, two ropes are used length and breadth wise and the intersecting point of the two ropes is considered as the centre of each pit. The pits are then filled with soil and pressed properly for better anchorage with the ground. Once the plantation is over, all the planted saplings are pruned uniformly at 3 or 4 feet height (crown height) from the ground level within 2-3 weeks and allowed to grow for 8-10 months as establishment period or even a year without harvesting leaf / disturbing the plants. However, weeding should be done as and when required during the establishment period to facilitate better growth. After 4 -5 months of plantation, the first weeding is done manually or by using power tiller to avoid damage and chemical nitrogen fertilizer only @ 50 kg per hectare is applied to boost the growth of plants. The required fertilizer in the form of urea / ammonium sulphate is applied near each plant when the soil is wet (tree basins are made and irrigated). If required gap filling can be made with properly grown sapling. Plants should be given lifesaving irrigation as and when required in non-rainy period for better establishment. Further, the whole planted area can be divided into small blocks of 15-20 plants in each having wide bunds all along the four sides to allow in-situ soil moisture conservation during rainy season. During the establishment period, single main stem is allowed to grow for about six months and then pruned at a height of 3 or 4 feet from the ground level with three to four branches.

Pruning and package to be followed from the second year

Once the plantation is established properly, the plants are pruned uniformly at the same crown height (3.50 feet) where the plants were pruned earlier during the time of plantation and establishment. This should invariably be followed only during rainy season (July - September) to facilitate the vigorous growth of shoots from the second year onwards. Farmyard manure @ 10

MT per hectare per year is applied within a week of pruning with the help of tractor / power tiller / country plough to mix the manure with soil and to save the man days. Immediately after this, basins around the plants are properly dug and made weed free to apply chemical fertilizers and irrigation water.

Tree basins allow the rain water percolation near the plants. Depending upon rainfall, NPK chemical fertilizers are applied @ 150:60:60 kg per hectare per year in two equal splits in the form of ammonium sulphate for alkaline soils or urea for acidic soils in early and later part of rainy season. Green manuring with sun hemp or dhaincha for the improvement of soil fertility and water holding capacity or intercropping with short duration crops (Groundnut, Cowpea, Horse gram, Ragi etc) for augmenting income can also be done from the second year onwards. If the plantation is inoculated with VA-mycorrhiza followed by green manuring, reduced dose of FYM & NPK fertilizer can be applied @ 10 MT and 50:25:25 kg per hectare per year respectively. Leaf

can be harvested by individual leaf picking after every three months depending upon the rainfall and soil moisture condition. Thus, it is possible to harvest 3 - 4 crops annually ranging from 7 - 8 MT of leaf per hectare per year.

The mulberry garden establishment takes two years and during that time farmer can take hardy crops *viz.*, Horse gram, Ragi etc. After establishment of tree mulberry garden, the farmers can get 7-8 tons of mulberry leaves. The farmers can utilise 7- 8 tons of mulberry leaves for rearing of silkworm larvae out of 700-800 disease free laying in phased manner in a year and can produce 500-550 kg cocoons besides reaping intercrops yield. The sale of cocoons alone can fetch an income of Rs 2-2.25 lakh. A net profit of Rs. 1.20 to 1.35 lakh can be got only through utilization of mulberry leaves out of tree mulberry cultivation. The same technology under irrigated conditions can yield 40-45 tons of mulberry leaves and 4000-4500 DFLs can be reared and this can fetch an income of 6-8 lakh per year.

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