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Mulberry Saplings Raising in Nursery Under Irrigated and Rainfed Regions

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Mulberry (*Morus* spp.) is a fast-growing, deciduous woody tree species of the Moraceae family with a perennial nature and origin in the Himalayan foothills of India and China (Rohela et al., 2020). Mulberry is widely recognized for its economic importance in producing mori silk through feeding of leaves to silkworms (*Bombyx mori*) (Vijayan et al., 2004). Besides the leaf, other parts of mulberry such as fruits, timber, roots, etc. are also used for several economic purposes, which include human consumption and medicinal value. Mulberry is propagated through root cuttings, saplings, grafting, air layering and seed propagation. Among these cuttings are most common among the farming community due to their reliability, accuracy and efficiency. However, Saplings are also used often, they are rooted cuttings used as planting material. The future development and productivity of mulberries are significantly influenced by the successful establishment of the plants. Usually, mulberry saplings are used for the establishment of plantations over direct planting of cuttings because of their advantages.

- The requirement for the planting material is quite less
- Quick plant establishment
- High survival rate due to strong root system
- Gives uniform plant stand
- Easy to remove an undesirable variety
- More vigorous and lustrous growth
- Rapid growth with more branches and leaves in a shorter period
- Plants can withstand moisture stress better
- Plants can be trained easily
- Suitable for high bush and tree plantation

For establishing low and high-bush plantations four-month-old saplings are used, while eight-month-old saplings are used for establishing tree plantations. Softwood and semi-soft

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wood cuttings are used for raising the sapling. Hardwood cuttings are used rarely when softwood and semi-softwood cuttings availability is scarce.

Raising Saplings under Rainfed Conditions

Site selection and land preparation

To achieve good cuttings, selection of land is critical, the land should be highly fertile with appropriate drainage, free from diseases, insects and other pests. The nursery operations are generally undertaken in the months of June or July, likely after sufficient rainfall. The land should be thoroughly ploughed and harrowed to bring soil to a fine tilth. Followed by, mixing ample amounts of FYM/compost and raising the bed to the appropriate height. The raised beds of 3.0 x 1.2 x 0.05 m in size with loose soil up to 45 cm depth and a distance of 30-45 cm between two nursery beds should be maintained.

a. **Planting material:** At most care should be taken for the selection of mulberry varieties, preferably suitable for the rainfed conditions. The plants should be free from scale insects and mealy bug infestation (tukra disease). Healthy shoots of 1–1.5 cm girth are used for making shoot cuttings of 20–25 cm length with 4-5 healthy buds. Cuttings should always be taken from the centre portion of the shoot; the greenish-tender section or the excessively thick lower branches should be avoided. While making the cuttings, the upper end of the cuttings should have a horizontal cut and the lower end should have a slant cut. While preparing cuttings care should be taken to avoid any damage to buds and cut ends. Planting of cuttings should be done within the shortest possible time gap, if not possible, they can be kept for one to two days in the shade using a wet gunny cloth to keep them moist. The harvested cuttings are transported during the cooler periods of the day to prevent drying and desiccation during transport.

b. **Planting:** Before planting, pre-treat the cuttings with Dithane M-45 (0.1%) for 30 minutes or Bavistin (0.2%) for 10 to 15 minutes to prevent diseases. Subsequently, dip the base of cuttings in authentic *Azospirillum* sp. solution for 20 minutes (one kg in 40 litres of water) for early root inducement. Bundle (20 or 30 cuttings/bundle) the cuttings with the lower cut ends on one side having the same plane and dip them in 20 ppm Naphthalin Acetic Acid (NAA) for 24 hrs for improved rooting. Then make holes at a spacing of 15 x 30 cm in nursery beds using a sharp stick or digger and plant the cuttings in a straight position,

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leaving one bud above the soil. Press the soil around the cuttings firmly to avoid the fall and do not disturb the cuttings after planting as it would affect the survival rate. For better rooting, cuttings can be dipped in root-promoting hormones like naphthalin acetic acid (NAA) at a concentration of 20 ppm for 24 hours.

c. **Maintenance of nursery:** For successful nursery raising, removing the weeds at 35 to 40 and 60 days after planting is essential. Apply urea at 0.30 kg/bed when saplings have attained 20-25 cm height (60 days old) preferably after 2nd weeding. Take suitable measures for managing pests and diseases. To control the leaf spot disease, spraying of 0.2% Bavistin twice at an interval of 15-20 days. Spray 0.1% Rogor or Metasystox for protection against thrips and mites.

d. **The uprooting of saplings and transportation**

The saplings are ready to uproot after two to three days of rainfall, dig deeply on both sides and loosen the soil to carefully uproot individual saplings. Store the saplings in the shade and cover them with wet gunny cloth until they are transported. Bundle the saplings into convenient sizes and cover them with wet gunny cloth or green leaf during transportation to avoid moisture loss. Plant the saplings as soon as possible to prevent mortality. It is recommended to use 8-month-old saplings for planting (one sapling per pit) and support them with pot watering during the initial period of establishment. Planting time can be adjusted to rainfall for at least 1 to 2 months period to achieve higher survival, quick establishment and maximum growth of plants. Normally, 7-8 months after planting cuttings are ready for transportation.

1. **Raising Saplings for Irrigated Conditions**

a. **Site selection and land preparation:** Select the land which is highly fertile with good drainage and the soil should be free from diseases, insects and other pests. Land should be thoroughly ploughed and harrowed to bring soil to a fine tilth. Mix the soil with an ample amount of FYM/compost. Make beds of size 3.0 x 1.2 size with loose soil up to 45 cm depth. Keep a distance of 30-45 cm between two nursery beds.

b. **Planting material:** Successful raising of cuttings depends on the selection of good planting materials, hence select varieties suitable for irrigated conditions. The selected cuttings should be free from scale insects and mealy bug infestation (tukra disease). Then, the

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selected healthy shoot has a girth of 1–1.5 cm with a length of 15–18 cm and has 3-4 healthy buds. Cuttings should always be taken from the centre portion of the shoot; the greenish-tender section or the excessively thick lower branches should not be taken. The upper end of the cuttings should be made horizontally cut and the lower end should have slant cut. While preparing cuttings care should be taken to avoid any damage to buds and cut ends. Planting of cuttings should be done within the shortest possible time gap. If there are no other options, they can be kept for one to two days in the shade using a wet gunny cloth to keep them moist. Transport the cuttings during the cooler periods of the day to prevent drying and desiccation during transport.

c. **Planting:** Pre-treat the cuttings with Dithane M-45 (0.1%) for 30 minutes or Bavistin (0.2%) for 10 to 15 minutes to prevent diseases. Then make holes at a spacing of 10 x 15 cm in nursery beds using a sharp stick or digger and plant the cuttings in a straight position, leaving one bud above the soil. Press the soil around the cuttings firmly. Do not disturb the cuttings after planting as it would affect the survival rate. For better rooting, cuttings can be dipped in root-promoting hormones like naphthalin acetic acid (NAA) at a concentration of 20 ppm for 24 hours.

d. **Maintenance of nursery:** Sprouting occurs in 10-12 days after planting with an approximate 75-80 percent survival. Irrigate the nursery once in 4 - 5 days or irrigate the plots regularly depending on need and provide shade if needed. Do hand weeding at 50- 55 days after planting and 100 g of urea per sq m is applied after weeding. Care should be taken during cultural operations to make sure no saplings are damaged. Take suitable measures for managing pests and diseases. To combat the leaf spot disease, spray 0.2% Bavistin, twice at an interval of 15-20 days. Spray 0.1% Rogor or Metasystox for protection against thrips and mites.

e. **The uprooting of saplings and transportation:** Normally, saplings attain a height of 90-120 cm by 4 months after planting and are ready for transportation. Dig deeply on either side and loosen the soil to carefully uproot individual saplings. Store the saplings in the shade and cover them with wet gunny cloth until they are transported. Plant the saplings without delay to obviate the problem of mortality. It is ideal to use 4-month-old saplings (1 sapling per pit).

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Land preparation for nursery

Preparation of Cuttings

Fungicide treatment for cuttings (Dithane M-45 treatment is done for 10 to

Planting of cuttings in nursery beds

References

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