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Raising of Mulberry Saplings in Nurseries

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Mulberry (*Morus spp.*) saplings are rooted cuttings that possess a well-developed and healthy root system, which enables them to establish quickly in the field. Compared to direct planting of cuttings, the use of rooted saplings offers several agronomic advantages, including uniform establishment, reduced mortality, faster initial growth, and earlier availability of quality leaves for silkworm rearing. This practice is particularly beneficial in commercial sericulture, where consistent and high-quality leaf yield is crucial.

The establishment of a sapling nursery should follow a systematic and scientific approach to ensure maximum efficiency and productivity. This involves careful site selection, soil preparation, irrigation management, pest and disease prevention, and the use of high-yielding, disease-free mulberry varieties.

From a well-maintained six-month-old mulberry garden of one acre, approximately 6 metric tonnes (MT) of seed material can be harvested. Each metric tonne of seed material has the potential to produce about 27,000 cuttings. Thus, from a single acre, around 1.62 lakh cuttings can be obtained, which can subsequently be rooted and raised into saplings for either field establishment or further multiplication.

This approach not only optimizes the use of available land resources but also ensures that the planting material is of high physiological quality, thereby contributing to higher productivity and profitability in mulberry cultivation and the sericulture industry as a whole.

Preparation of Nursery Bed

1. Site Selection: Choose a flat plot of land with a reliable water source. The soil should be well-drained and loamy, as this type of soil ensures good root development and prevents waterlogging. Avoid low-lying areas prone to stagnation.

2. Primary Tillage: Plough or dig the soil to a depth of 30–40 cm. Leave the field exposed to direct sunlight for 2–3 weeks to allow weathering, natural aeration, and destruction of soil-borne pests and pathogens.

3. Secondary Tillage: Plough the land 2–3 additional times to obtain a fine tilth. This improves soil aeration, facilitates uniform root penetration, and enhances moisture retention.

4. Cleaning the Field: Remove all unwanted materials such as root stocks, pebbles, stones, and weeds. This prevents competition for nutrients and ensures uniform plant growth.

5. Bed Formation: Prepare rectangular nursery beds measuring 300 cm × 120 cm. The raised bed system helps in better drainage and root aeration.

6. Irrigation Channels: Provide irrigation channels measuring 25–30 cm in width between beds to facilitate efficient and uniform water distribution.

7. Manure and Soil Amendment: Apply 5 pans of well-decomposed organic manure to each bed. In heavy clay or black cotton soils, incorporate an additional 5 pans of river sand per bed to improve drainage and soil texture. Mix thoroughly with the topsoil before planting.

Preparation of Cuttings

1. Selection of Mother Shoots: Choose healthy, disease-free mulberry shoots that are 6–8 months old with a stem diameter of 10–15 mm. Select material from high-yielding, true-to-type plants to ensure genetic purity.

2. Pest and Disease: Check Ensure that selected shoots are free from tukra (pink mealybug), scale insects, or any visible symptoms of pest infestation or fungal infection. This prevents the spread of pests and diseases to the nursery.

3. Portion Selection: Avoid using the stout basal portion of the shoot, as it tends to be too woody and slow to root, and the tender green upper portion, as it is physiologically immature and prone to desiccation. Select only the middle portion, which is physiologically active and suitable for rooting.

4. Cutting Size and Bud Requirement: For sapling production, prepare cuttings of 15–20 cm length, ensuring 3–4 healthy, well developed buds per cutting. The lower cut should be just below a bud to encourage root initiation, and the upper cut should be slightly above a bud to protect it from drying.

5. Tools and Cutting Technique: Use secateurs or a mulberry cutting preparation machine to obtain smooth, clean cuts without crushing the stem tissue. Clean cuts reduce infection risk and enhance rooting success.

Caring for Cuttings

1. Immediate Planting: Plant the prepared cuttings immediately after preparation to prevent moisture loss and ensure maximum rooting success. Delays in planting can cause desiccation and reduce viability.

2. Short-Term Protection: If immediate planting is not possible, wrap the cuttings in moist gunny cloth to retain humidity. Keep them in a shaded, cool place to minimize physiological stress.

3. Temporary Storage Method: When storage is unavoidable, arrange the cuttings in bundles with all buds oriented in the same direction. Place the bundles upright in wet sand beds, ensuring that the buds face upward. Cover the bundles lightly with hay or straw to maintain moisture and protect against direct sunlight.

4. Moisture Maintenance: Sprinkle water over the stored bundles daily to keep them hydrated. Under these conditions, cuttings can be safely stored for 2–3 days without significant loss of viability.

5. Precaution: Extended storage beyond three days is not recommended, as prolonged storage can reduce rooting ability and encourage fungal growth.

Planting

1. Pre-Planting Bed Preparation : Irrigate the nursery beds 1–2 days prior to planting. This ensures the soil is moist, friable, and well-settled, which facilitates easy insertion of cuttings and promotes early root initiation.

2. Spacing for Different Sapling Ages

- **For 3–4 month-old saplings:** Plant cuttings at a spacing of 8 cm within rows, with 20 cm between rows.
- **For 6–9 month-old saplings:** Plant cuttings at 10 cm within rows, with 30 cm between rows to allow for more robust growth.

3. Row Marking: Mark rows using a taut thread to maintain uniform spacing. Create small holes at the designated planting points using a dibbler or similar tool to avoid damaging the buds during insertion.

4. Fungal Disease Prevention: Before planting, disinfect the cuttings to minimize fungal infection risk:

- Dip in 0.2% Bavistin solution for 15 minutes
- OR dip in 0.1% Dithane M-45 solution for 30 minutes

5. Planting Technique: Insert the cuttings vertically, ensuring they are firmly placed to maintain soil contact. Keep only one healthy bud exposed above the soil surface, with the rest buried to encourage rooting.

Irrigation

1. Initial Watering

Immediately after planting, irrigate the beds thoroughly to settle the soil around the cuttings and eliminate air pockets.

2. Subsequent Watering Schedule

- **In sandy loam or red soils:** Irrigate every 4–5 days
- **In black cotton or clayey soils:** Irrigate every 6–7 days

Adjust the frequency based on weather conditions, ensuring that the soil remains moist but not waterlogged.

Maintenance of Nursery

1. Growth Stages

- **Sprouting:** Buds begin to sprout 10–12 days after planting.
- **Root Initiation:** Root primordia form approximately 30 days after planting.
- **Root Development:** A well-developed root system is established within 70–80 days.

2. Shoot Management

Allow only one healthy, vigorous shoot to develop from each cutting. Remove any secondary shoots or suckers early to promote straight stem growth and better sapling quality.

3. Weeding

- First weeding: 25–30 days after planting.
- Second weeding: 55–60 days after planting.

Timely weeding prevents competition for nutrients, water, and light, ensuring healthy growth.

Fertilizer Application

After the second weeding, apply:

- 150 g ammonium sulphate or 35 g urea per bed.

Follow this with light irrigation to help dissolve and incorporate the fertilizer into the root zone.

Plant Protection

1. Common Nursery Diseases

- Stem canker (*Botryodiplodia theobromae*)
- Cutting rot (*Rhizoctonia solani, Pythium spp.*)
- Collar rot (*Sclerotium rolfsii*)
- Dieback (*Fusarium spp., Colletotrichum spp.*)

2. Disease Management:

- Treat affected plants or beds with 0.2% Bavistin or 0.1% Dithane M-45 solution.
- Ensure good drainage and avoid water stagnation to reduce fungal disease incidence.

Planting of Saplings

1. Selection Based on Planting System

- **For bush system:** Select healthy, 3–4 month-old saplings measuring 90–120 cm in height.
- **For tree plantation, high-bush, or high-crown height systems:** Use 6–9 month-old saplings exceeding 150 cm in height. These are more robust and suitable for long-term growth.

2. Pre-Uprooting Irrigation

Water the nursery beds thoroughly 2–3 days before uprooting. This softens the soil, making it easier to remove the saplings without causing damage to the root system.

3. Uprooting Technique

Loosen the soil to a depth of about 30 cm using a crowbar, guddali, or pickaxe. Carefully lift the saplings from the bed, ensuring the main roots remain intact to reduce transplant shock.

4. Immediate Planting

Transfer the saplings immediately to pre-dug pits in the main plantation area. Planting should be done without delay to maintain root moisture and maximize survival rates.

5. Transporting Saplings

For long-distance transportation, arrange saplings into bundles with roots aligned in the same direction. Wrap the roots with wet gunny cloth or fresh green leaves to prevent drying. Transport them during cooler hours of the day to minimize heat stress and water loss.