



Establishment and Management of Modern Nursery



Central Institute for Subtropical Research
Rehmankhura, Lucknow

ESTABLISHMENT AND MANAGEMENT OF MODERN NURSERY

Success of any orchard mainly depends upon the availability of right type of planting material. Initial planting material is the basic requirement on which the final crop depends both in quality and quantity. In case, any mistake made during initial years, cannot be rectified in subsequent years and will cause everlasting damage to productivity and income of the orchardists. Non-availability of genuine seeds and *elite* planting material is one of the major constraints in obtaining expected productivity in fruits. As per estimation, requirement of planting material by the end of 10th plan will be around 1185 million. The planting material must be sourced from consistently high yielding mother plants raised in scientific way and free from major pests and diseases.

SHORTCOMINGS IN NURSERIES

- Invariably scion shoot are collected from diseased and infected trees (vegetative malformation in mango, viruses in citrus and temperate fruits).
- Scion shoots are often taken from juvenile trees.
- Invariably scion shoots are taken from the mother plants without knowing its history.
- Enough rotation is not practised in the nursery and same bed is used repeatedly year after year.
- In general, plants are multiplied in the bed, hence every time, 4-6 kg soil is transported as earth ball.
- Distant transport of plants along with earth ball is tedious, expensive and less efficient.
- Often, number of diseases and pests (root rot, collar rot, wilt, nematodes) are carried along with earth ball.
- Production of less number of plants per unit area.
- In most cases provision of source for rootstock is lacking.



BASIC CHARACTERISTICS OF MOTHER PLANT

- Consistent high performance and maximum yield over 3-5 years.
- High quality fruits.
- Free from incidence of pest and diseases.
- The plants should attain full bearing age before taking scion stick.

MAINTENANCE OF MOTHER PLANTS

- Initial propagation from elite clones which are planted at closer distance (4-6m).
- Application of manures and fertilizers.
- Irrigation.

- Weeding and inter-culture operations.
- Training and pruning.
- Appropriate plant protection measures.

LIMITATIONS OF PROPAGATION IN FIELD

- For earth ball clay or clay loam soil is required.
- Rootstock and propagated plants require frequent shifting.
- Requirement of more manpower for effective weed control.
- Mortality during shifting and transplanting.
- With every plant, 4-6 kg good soil is transported.
- Earth ball is a good source for pest and pathogens dissemination.

PROMOTION OF POLY / NET HOUSE

- Year round propagation.
- Control over seed germination, better growth and success.
- Efficient and cheaper technique.
- Better possibility of establishment.
- Cheaper and quick transport.

COMPOSITION OF ROOTING/POTTING MIXTURE

- Rooting/potting mixture is to be prepared in the following composition:

| | | |
|----------------------------------|---|--------|
| ● Soil | : | 1 part |
| ● Sand | : | 1 part |
| ● FYM/ Vermi /Biodynamic compost | : | 1 part |
- Solarization of rooting/potting mixture with white polythene for 1.5 months (April – June) or sterilization with Formaldehyde or basmid.

PROPAGATION

- Seed
- Inarching
- Budding
- Veneer grafting
- Softwood grafting
- *In-situ* establishment

SEED

- Suitable for propagation of papaya, phalsa, kagzilime and karonda.
- Seeds should be obtained from mature fruits.
- Rootstocks of most of fruits are propagated by seed for vegetative propagation.
- Plants propagated by seeds are variable in growth and have long juvenility hence commercial propagation of mango, aonla, bael etc. should be discouraged.

INARCHING (APPROACH GRAFTING)

- This method needs to be discouraged.
- It takes almost two years.
- Cumbersome and tedious.
- Limited scion shoots are available on the mother plant.
- Root stock is to be brought in close proximity of scion shoot
- It is a source for spread of malformation in mango.

VENEER GRAFTING

- Rootstocks of 1 year age (0.50 to 0.75 cm diameter) are used.

- A slanting downward and inward 30-40 mm long cut is made in the smooth area of the stock at a height of about 20 cm from bottom.
- At the base of the cut, a smaller and shorter cut is made to intersect the first so as to remove the wood and bark.
- Scion of similar thickness is selected having a length of 2.5 to 10 cm and 4-5 months old.
- It should preferably be a terminal and non-flowering shoot.
- Selected scions are defoliated on the mother plant 7-10 days prior to detachment.
- Base of the scion is given a long cut on side and short cut on the opposite side to match the cuts on the rootstock.
- The scion is inserted into the cut portion and graft union is tied with transparent polythene strip and kept in polyhouse.
- This method can be adapted from March to September under field conditions.
- Practiced in mango, aonla, cashewnut, custard apple, walnut etc.



SOFT WOOD GRAFTING

- Newly emerged stock shoots of 1 year old rootstock, seedlings having bronze coloured (specially in case of mango) leaves are selected for cleft grafting.
- Scion wood to be used is defoliated 7-10 days prior to grafting.
- Thickness of stock shoot and scion stick should be the same.
- After grafting, it is firmly tightened with 1.5 cm wide, 4.5 cm long and 200 gauge polythene strip.



- This can be performed in open field or containers.
- With use of poly and net house, grafting operation can be continued almost year round.
- Practiced in mango, cashew, guava, aonla, bael, jack fruit etc.

PATCH BUDDING

- Prepare the rootstock seedlings by removing side shoots frequently.
- Select seedlings having straight growth and thickness of 0.8 to 1.25 cm in diameter. Usually such thickness is attained after 5-7 months of growth.
- For high success in budding, temperature (30-32°C) and humidity (80-90%) is ideal.
- Select 6-9 months old determinate shoots as scion sticks from mother plant.
- Remove the leaf blades but not the petioles from the scion sticks; wrap them in polythene and store in cool place.
- Remove rectangular bark patch of 1 cm x 3 cm size from selected rootstock seedlings (having 0.8 to 1.2 cm thickness), and 15-20 cm above from root media in the poly bag, by a sharp budding knife.
- A patch of 1 cm x 3 cm size from scion sticks is also taken out. Scion stick having fully developed and swollen buds but not sprouted, should be taken.
- The scion patch is placed carefully on the removed portion of the bark of rootstock.
- Tie with polystrip, keeping the bud naked and without leaving any air pocket.
- Shift the budded plants in the poly house for taking advantage of optimum temperature and humidity for higher bud burst.
- Bud starts sprouting after 15-20 days. Cut the rootstock 20 cm above the bud union.
- Again after 15 days when sprouted bud has grown up to 3.0 cm, cut the rootstock 5 cm above the bud union.
- Only sprouted bud is to be allowed to grow, remove all other shoots regularly.
- Shift the budded plants in the open area for a few days before these are shifted to Post Propagation and Maintenance and Sale Nurseries (PPMS).
- Practiced in aonla, guava, bael, jack fruit, tamarind etc.

SOFTWOOD CUTTING

- Suitable for the propagation of grapes, guava, lemon, pomegranate, fig and mulberry.
- In guava, cuttings (8-10cm) are made from current herbaceous growth.
- After treating with suitable concentration of



rooting hormone, planted in suitable rooting media.

- Intermittent misting is required for better root initiation.
- Root initiation takes place after one and a half months.
- After root initiation, plants are shifted to plastic containers for establishment and kept in mist chamber for few days.
- After proper establishment plants shifted to net house for hardening.



IN-SITU ORCHARDS ESTABLISHMENT

- Suitable for quick establishment of the orchard.
- Rootstocks are planted directly in the field.
- After one year grafting/budding performed in the field.

STRATEGIES

- Promotion for establishment of large and small size nursery under supervision of State/ Central Government/Corporate Sector.
- Provision of facilities like Poly, Net houses and containers for year round multiplication of fruit plants.
- Promotion of concept regarding role of establishment of separate mother block and their maintenance.
- As far as possible, provision of rootstocks should also be made available in the nursery.
- There is a need to review the "Nursery Act" and after due modification it should be strictly implemented.
- Papaya-seed production needs to be encouraged with appropriate isolation or micro propagation techniques for commercialization.
- There is also need to work out standards for different fruit plants and nurseries in the public and private should strictly adhere with it.
- Nursery activity should be concentrated in the major fruit belt areas of the respective fruits, so that distant transportation is avoided.
- An agency responsible for certification of seed and planting material need to be established in different states for monitoring the nurseries.

Authors : **R.K. Pathak and R.A. Ram**

For more details, contact :

Director

Central Institute for Subtropical Horticulture

Rehmankhara, P.O. Kakori, Lucknow - 227107

Tel. : (0522) 2841022-24 Fax : (0522) 2841025

E-mail : cish2000in@yahoo.co.in

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