



Hi-tech nursery and its management

Arif Hussain Wani and K.M. Malik

Division of Horticulture, Faculty of Agriculture, Wadura, SKUAST-Kashmir (J&K) India

(Email : arifphdflori909@gmail.com)

A nursery is a place where plants are propagated and grown for further transplanting at some other place. They include retail nurseries which sell to the general public, wholesale nurseries which sell only to businesses such as other nurseries and to commercial gardeners and private nurseries which supply the needs of institutions or private sector. Some retail and wholesale nurseries sell by mail. Nurseries may supply plants for garden and fruit planting, for forestry and conservatories and botanical gardens. Some nurseries specialize in propagation, growing out and retail sale; or in ground covers, shade plants, or rock garden plants. Some produce bulk stock, whether seedlings or grafted plants of particular varieties for purposes such as fruit trees for orchards, or timber trees for forestry and ornamentals for public gardens. Some produce stock seasonally such as in spring time for export to colder regions where propagation could not have been started so early, or to regions where seasonal pests prevent early growing.

Objectives of Hi-tech nursery:

- Some important species do not seed every year. Vegetative propagation of these species is done annually, only by sowing all available seeds in nursery to raise seedlings to be planted out in coming years.
- Some species grow very slowly and if the seeds of these species are sown, the seedlings are most likely to be suppressed by weeds and ultimately got killed. Therefore, slow growing species are generally raised in nursery and planted out, only when the seedlings are not liable to be damaged by weeds.
- Success of road side avenue plantations depends largely on planting tall and sturdy plants which can only be obtained from nursery stocks.
- Plantations of some species, when raised by direct sowing are not so successful when raised by transplanting of their seedlings. In such cases, nursery is an essential part of artificial regeneration of these species.
- The best method for introduction of exotics, temperate pines, poplars and other valuable ornamentals is only by planting and therefore nursery is very essential for their success.

- Planting of nursery grown plants is the surest method of artificial regeneration on poor and barren sites.
- Causalities in plantations have to be replaced either during the year of planting or in the next year. Therefore, replacement of causalities is always done by planting nursery grown plants or stumps and so nursery is very essential for causality replacement also.

Benefit of raising seedlings in nursery:

- It is very convenient to look after the tender seedlings
- It is easy to protect the seedlings from pests and diseases
- Economy of land usage (crop duration in the main field is reduced)
- Valuable and very small seeds can be raised effectively without any wastage
- Uniform crop stand in the main field can be maintained by selecting healthy, uniform and vigorous seedlings in the nursery stock.

Types of nurseries: Nurseries are categorized in different ways.

Based on time duration:

Temporary nursery : This type of nursery is established near the planting site. Once the seedlings for planting are raised, the nursery becomes part of the planted site. There are sometimes called “flying nurseries”. This type of nursery is developed only to fulfil the requirement of the current season or a targeted project. The nurseries for production of seedlings of transplanted vegetables and flower crops are of temporary nature. Likewise temporary arrangement for growing various ornamental tree seedlings for planting in particular area can also be done in temporary nursery.

Permanent nursery : This type of the nursery is placed permanently so as to produce plants continuously. These nurseries have all the permanent features. The permanent nursery has permanent mother plants. The work goes on continuously all the year round in these type of nurseries. These can be large or small depending on the objective and the number of seedlings raised annually. Small

nurseries contain less than 100,000 seedlings at a time while large nurseries produce more than this number. In all cases permanent nurseries must be well-designed, properly sited and with adequate water supply.

Based on type of plants produced:

Fruit plant nurseries : In this nursery, seedlings and grafts of fruit crops are developed.

Vegetable nurseries : In this nursery, seedlings of cauliflower, cabbage, brinjal and tomato cucurbites etc. are grown.

Flowers plants nurseries : The seedlings of flowering plants like gerbera, carnation, petunia, salvia, rose, chrysanthemum, coleus, aster, dianthus etc., are developed in these nurseries.

Forest nurseries : The seedlings of plants useful for aforestration like pine, oak, teak, eucalyptus etc., are grown her and then sold out.

Miscellaneous nurseries : In such type of nurseries plants with great economic value like rare aromatic and medicinals, herbal plants are propagated. Plants like Lavender, rosemary, geranium, rose, calendula, marigold etc., are also propagated.

Planning of nursery : One has to decide about which type of nursery and plants to grow

Selection of site : Site is the basic requirement of a nursery. Site is a place upon which one can produce seedlings of plants. Site should be near to the road and habitate and have suitable climate and good soil conditions. It should neither be a shady area nor more fully exposed area. However there should be sufficient sunlight and good irrigation facilities. The site should be well connected with motorable road facilities.

Management of nursery : Nursery plants require due care and attention germination from the seeds or have been raised from vegetative means or through tissue culture techniques. It is the main objective of a commercial nursery grower to supply the nursery plants with suitable conditions necessary for their growth and development. The major work of nursery management includes which all such operations right from the emergence of young plantlet till they are fully grown-up or are ready for uprooting and transplanting in the main fields.

Potting the seedlings : Before planting of sapling in the pots or polybags, the pots should be filled up with proper potting mixture. Now a day's different sizes of earthen pots or plastic containers are used for propagation. For filling of pots loamy soil, sand and compost can be used in 1:1:1 proportion. Sprouted cuttings, bulbs, corms or polythene bag grown plants can be transferred in such

pots for further growth. All the necessary precautions of selection of pots, preparation pf potting mixture are taken care off before actual planting of saplings in the pots.

Manuring and irrigation : Generally sufficient quantity of nutrients is not available in the soil used for seedbed. Hence, well rotten F.Y.M / compost and leaf mould is added to nursery soil. Before transferring to the permanent location, rooted cuttings, layers or grafted plants, require fertilization. Addition of fertilizers will give healthy and vigorous root and shoot system. It is recommended that each nursery bed of 10 x10m area should be given 300 g of ammonium sulphate, 500 g of single super phosphate and 100 g of muriate of potash. Irrigation either in the nursery beds or watering the pots is an important operation. For potted plants hand watering is done and for beds low pressure irrigation by hose pipe is usually given. Heavy irrigation should always be avoided.

Plant protection measures : Adoption of plant protection measures, well in advance and in a planned manner is necessary for successfully raising the nursery plants. For better protection from pest and diseases regular observation is essential.

Disease control in seedbed : The major disease of nursery stage plant is "damping off". For its control good sanitation conditions in the nursery and surrounding area is necessary. Preventive measures like treatment with 50% ethyl alcohol, 0.2% calcium hypo chloride and 0.01% mercury chloride is necessary. These treatments are given 3-5 days before actual seed sowing.

Soil treatment : Soil contains harmful fungi, bacteria, nematodes and even weed seeds, which affect the growth and further development of nursery plants. These can be eliminated by heat, chemical treatment. For that soil is disinfected by heating to the temperature of about 60°C for 30 minutes.

Chemical treatment : The chemicals like formaldehyde, methyl bromide, chloropicrin, vapam are used. Other diseases like rust, powdery mildew, leaf spot, bacterial blight, yellow vein mosaic are also observed. For control of these diseases Bordeaux mixture, Carbendazime, Redomil can be used. Tricodermaviride a biofungicide can also be tried out.

Weed control : Weeds compete with plants for food, space and other essentials, so timely control of weeds is necessary. For weed control hand weeding, uses of cover crops, mulching and use of chemicals (weedicides) are practiced. Pre-emergence weedicides like basaline or post-emergence weedicide like 2; 4-D and glyphosate are useful.

Measures against heat and cold : The younger seedling is susceptible to strong sun and low temperature. For protection from strong sun, shading with the help of shade net (50%) is being provided.

Packing and handling of nursery plants : Packing is the method or way in which the young plants are tied or kept together till they are transplanted. So they have to be packed in such a way that they do not lose their turgidity, moisture level and are able to establish themselves on the new site. At the same time, good packing ensures their success on transplanting. For packing, baskets, wooden boxes, plastic bags are used. In some parts of the country banana leaves are also used for packing the plants with their earth ball. This is useful for local transportation.

Sale management : In general the main demand for nursery plants is during spring and late autumn season in cold areas and in rainy season in tropics and subtropical areas. A proper strategy should be followed for sale of nursery plants. For that advertisement in local daily newspapers, posters, hand bills, catalogue and appointment of commission agents can be followed.

Management of mother plants : Care of mother plants is necessary so as to get good quality propagules and scion wood year after year. They should be protected from pests and diseases, provided irrigation and fertilization from time to time. Pruning of mother plants is necessary for vigorous growth. Mother plants are certified for phytosanitation.

Management of Hi-Tech nursery : A vital part of nursery management is planning the production schedules and data collection. As we know that whole agriculture sector is seasonal and perishable in nature and nursery production is highly seasonal. This is particularly observed when producing trees and other plants, as the demand for species or numbers of seedlings will vary considerably every year. Flexibility and planning are therefore essential. There are four main tools for planning nursery operations. A nursery calendar helps to plan necessary actions and purchases of seed, supplies and equipments. A plant development register for collecting species-specific information about seed treatment, germination requirements and duration, plant development, special requirements for potting substrate, watering, shading or plant protection measures.

A nursery inventory to keep track of the species and numbers of seedlings in different stages of development. A record of ongoing nursery experiments. All information can be maintained in tabular form designed for ease of data collection. Computerized systems have increased the flexibility of data collection and analysis, making it easy for a nursery manager to correlate the collected information

to necessary actions to be taken rapidly.

Tools for high-tech nursery management:

- Nursery calendars
- Plant development registers
- Nursery inventories
- Records of nursery experiments

These are needed for production management as well as for research. Also significance of staff training, particularly in the use of pesticides, plant protection and general safety issues regarding nursery management.

Planning tools :

Nursery calendar : A nursery calendar is a very essential tool in nursery planning. The date for sowing seeds can be calculated by counting backwards from the anticipated date of planting, taking into consideration the number of days needed for germination and further seedling development until the right stage for planting. Different species have different requirements for the planting out period (before or during the rains). The time in the nursery also depends on the site on which the seedlings are to be planted. Seedlings for drier sites may need to be larger and need more time in the nursery. Customers might need to be reminded of this when they order plant material to meet certain deadlines. It is also worth anticipating problems with poor germination and/or damping-off to allow time to sow a second time. Once a nursery calendar has been developed, it will help greatly in making decisions about different utilities in the nursery.

Plant development register : For plant development register we should keep a register for each species by seed lot, with information about seed sources used, pre-sowing treatment's, sowing date, time of germination, percentage of germination, percentage of saplings pricked out, potting substrate, microsymbionts used with its origin and type, plant development and condition under which produced. Include pests encountered and control treatments, if any, as well as data of plants and substrate nutrient analyses. All this information is important for nursery management and might later help explain unexpected results. It can also be used to compare results with published information and alert you to possible problems originating in the nursery, for example if the development is much slower than is reported elsewhere. It might open additional research areas, for example it might lead to trying different substrates, shading or fertilizer treatments. Good documentation about species handling and development is also necessary when staff changes.

Nursery inventory : A well-kept and up-to-date nursery inventory helps to assess whether the nursery is operating

as planned, and whether demands are being met. Your inventory should list all plants currently in the nursery by bed or frame number, and details of delivery of seedlings, including the site, name of owner and site conditions. It can be an important tool to record feedback from the planting sites and can then help to determine whether seedlings have the right quality for the sites on which they are planted.

Record of experiments : An up-to-date record of past and on-going nursery experiments is advisable. Simple experiments testing new potting mixtures, watering regimes, pre-sowing seed treatments etc. should be part of normal nursery management and without accurate records of these, valuable information is likely to get lost.

Staff training : A good nursery operation relies on continuity of staff that is professional, careful and honest. Although the casuals or technical workers do most of the work in the nursery, they must have knowledge about plant propagation. Understanding even in a simplified way the processes in germinating the seeds, a rooting cutting or a growing seedling and the importance of high humidity, watering, shading, etc. that will help prevent many errors in daily routine works. Workers applying the chemicals, know the basics of handling of pesticides, use of gloves and safety equipment's should be a standard practice and given utmost importance. Staff training can take the form of scheduled courses or of regular (weekly, monthly) staff meetings covering a particular topic of nursery management practices. This can be reinforced by repeating explanations of techniques during the course of work.

Conclusion : The aim of good nursery management is to provide material of the highest possible quality. The

importance of good nursery practices cannot be over-emphasized. The nursery should be maintained at the highest standard to ensure only healthy, vigorous and uniform plants are grown. Good quality plant material will yield higher productivity. Selection of good planting materials and strict culling in nursery are the important steps. Small scale tree nurseries and their managers have an important role in ensuring the sustainable development of rural communities in horticulture sector. It is essential that they obtain access to the knowledge, skills and resources necessary to maintain and enhance their capacity to produce the seedlings which form an integral part of the new planting systems.

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