Course Code & Name: FSC-111 Fundamentals of Horticulture 3(2+1)

Topic- Nursery Management and its Components

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What is Nursery ?

- Nursery is a place where seedling, saplings or any other planting materials are raised, propagated, multiplied and sold out for planting.
- A nursery is a managed site, designed to produce seedlings grown under favorable conditions until they are ready for planting.
- All nurseries primarily aim to produce sufficient quantities of high quality seedlings to satisfy the needs of users.
- In the existing infrastructure, there are just over 100 big nurseries. At present 30-40% demand for planting material is being met by the existing infrastructure

Importance of Nursery:

1. **The young seedlings require special attention during the first few weeks after germination. It is easier and economical to look after the young and tender seedlings growing in nursery bed in a small area than in a large permanent site.**
2. **Majority of fruit crops are propagated by vegetative means. The propagules require special skill and aftercare before transferring them in the main field. In a controlled condition in nursery all these can be provided successfully by skilled labour.**
3. **Cuttings are best rooted and grafts are hardened in the mist house chamber which is an integrated part of a nursery.**
4. **Direct sowing method is not so successful in several crops when compared with transplanting of seedlings raised in nursery.**
5. **Plants hardened in the nursery are preferred for causality replacement in orchards.**
6. **Besides these, raising of seedlings or saplings in nursery provides more time for pre-planting operations/preparations.**
7. **Seasoning/hardening of seedlings against natural odds is only possible in nursery.**

Guidelines for Nursery Raising

- Time of sowing/initiation of propagules production depend on how long the seedlings will take to have an optimum size of a seedling (with good rooting and about 20 cm tall) and coincidence of its ready availability at the time of initiation of monsoon (July for South West monsoon and October for North East monsoon areas). The number of plants required to be produced from a nursery can be calculated as below.

  Number of plants required for the season = W

  Mortality in nursery = X

  Transportation/culling loss = Y

  Seedling required of buffer loss = Z

  Total seedlings required to be produced from the nursery = W + X + Y + Z

In case of vegetative propagules, the success percentage also needs to be considered.

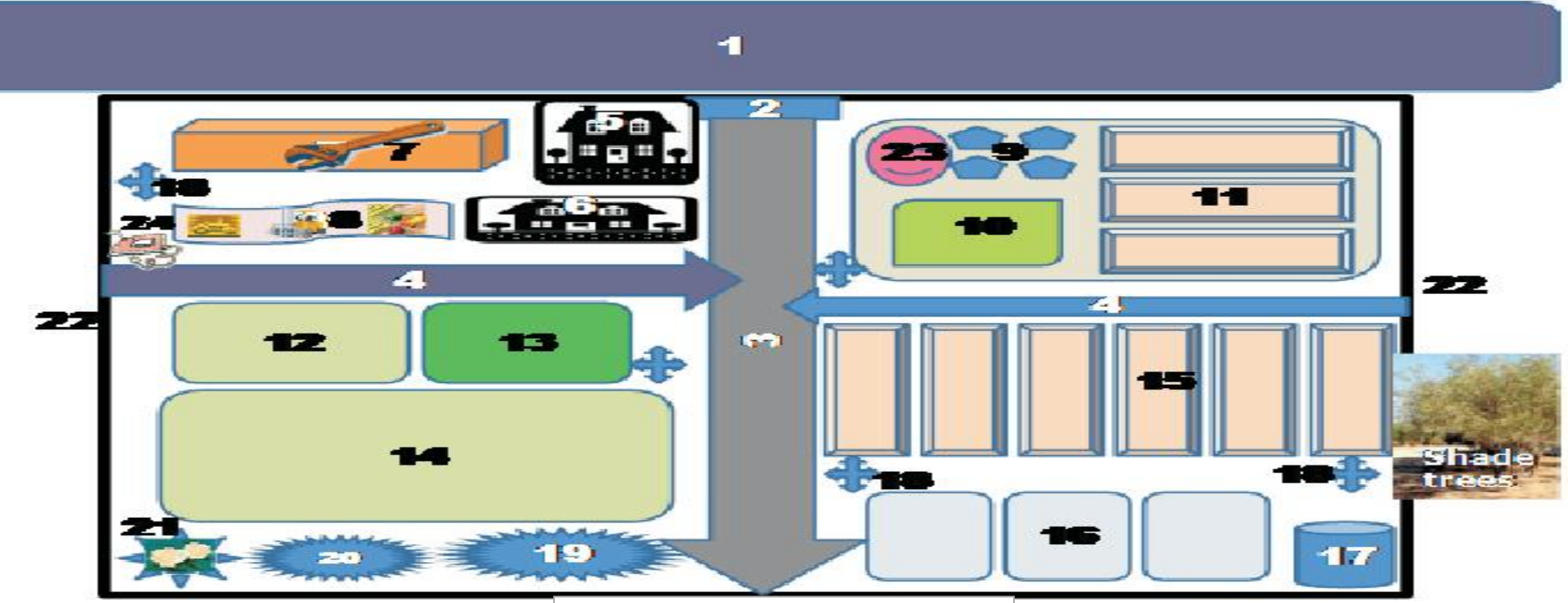
- Generally, it is assumed that the area of nursery should be 0.25% to 2.5% of the area to be planted or the area of nursery should be about 1 acre for every 30,000 seedlings. It also required

Components of a Good Nursery

- The nursery site should be located in the nutrient rich/medium soil, near to water source, free from soil pathogens and insects, availability of cheap and skilled labors and has good access to the main road for easy transportation.
- The site should be on gently sloping area and away from other tall crops: this is important for good drainage as well as to encourage air circulation. An appropriate site must be selected for the most effective, efficient, and economical design of a nursery.
- The purpose and target of plants to be produced will decide the site selection and its improvement.
- Careful observation of site conditions and an assessment of past and present climatic records are important.
- If desired, make a list of potential nursery sites and compare them using a decision matrix.

Layout of an Nursery

1. No standard blueprint for designing a plant nursery exists. On the contrary, each nursery will have a unique design based on distinct needs, resources, and requirements.
2. Generally a good nursery should consist of water tank/pond, water pump/pump house, seed and fertilizer store room, implement shed, germination/mother bed area; potting/container filling area, seedling raising area, worker mess/hall, office room, propagation structures, compost area, etc.
3. A nursery is usually arranged in a series of beds with pathway between them.
4. An open area is needed at one end, where work such as sieving of soil and filling of containers can be done.
5. Usually a room/shelter is required for staff and the watchman, and where equipment can be securely stored.
6. Layout should be in a way that enables operations to flow logically through the nursery so as to save labor and time.
7. Roads and paths within the nursery should be carefully planned. The nursery facilities should be kept clean.
8. Every effort should be made to control weeds in and around the nursery as weeds may host insects and



General layout of nursery

(1: Main road, 2: Gate, 3: Nursery road, 4: Path, 5: Office, 6: Labor shed, 7: Store rooms, 8: Vehicle shed, 9: Potted plants, 10: Saplings, 11: Seedlings, 12: Propagation/mist chamber, 13: Shade net house, 14: Poly house, 15: Seedling beds, 16: Mother beds, 17: Well/water source, 18: Water pipeline, 19: Soil dumping, 20: Compost area, 21: Mother plants, 22: Fencing, 23: Plant library, 24:

Inputs

Containers, nursery media, propagules, water, fertilizers, chemicals, electricity, tools, equipment, machineries and labor are the major input to nursery.

1. **Containers:** Made up of polythene (bags, pots, and root trainers), clay (pots) or iron material. Polybags are the cheap containers, while root trainers are user friendly, easy to handle and transport.
2. **Nursery Media:** The growth medium must be sufficiently firm to hold the seedling or propagules during rooting and supply food and water for the successful growth of young seedlings.Soil is a very common easily available and comparatively cheaper medium used in nursery. Sand is generally used in mother bed and vegetative plant propagation media. The other media used in nursery are peat soil, sphagnum mass, vermiculite, perlite, leaf mold, saw dust, grain husk and Coco peat. Among them vermiculite is mostly used for cuttings while sphagnum mass is used for air layering. Generally, availability of all mineral nutrients is affected by the pH of the growing medium. In growing media such as organic soils, maximum availability occurs between 5.5 and 6.5 pH

3. **Propagules:** Seed, cutting, rootstock, scion, explants, etc.
4. **Water and Fertilizers:** water for irrigation and fertilizer for major and minor nutrient supply.
5. **Chemicals:** Pesticides, fungicide, herbicides and growth regulators.
6. **Tools:** Axes, crow bar, wheel barrows, boxes, plastic buckets, watering cans, wire cutters, digging forks, hammer, nails, hoes, hand pruning knives, budding knives, respiratory masks, sprayers, saws, scissors, secateurs, budding and grafting knives, budding and grafting tape, germination trays, khurpis, iron pan, spade, forks, etc.
7. **Electricity:** For operating power machineries and to provide control environment in nursery.
8. **Equipment and Machinery:** The nursery operations like transporting, watering and sales depend on the vehicle and machineries and equipment's in the nursery. Among them tractor with trolley, disc plough, water tanker are necessary. The nursery potting media filling machine or automated container filling machines for nursery mixture preparation and filling, grafting machine facilitate the speedy operation of nursery in cost effective way.
9. **Labor:** Nursery is a labor intensive activity. Skilled and permanent labor engagement ensures quality seedling production and their maintenance in nursery.

Mother Bed:

- They are seed sowing beds prepared with fertile and clean nursery mixtures (Soil, sand and FYM).
- Generally they are rectangular in shape with 1 to 1.8 m width and 1.8 (in hills) to 12 m (in plains)

Types of mother

Raised bed: They are prepared by dumping soil about 10 to 15 cm above ground level. They are common in high rainfall areas to prevent water logging. These beds are good for the species which don't require more moisture for germination as vegetable and flower seedling, etc.

Sunken bed: They are prepared by excavating the soil in bed area. These beds are usually 10-15 cm deeper than the normal ground level. It prevents the out flow of water and conserves moisture. Seeds with hard coat (*Acacias, Acer*, Karonda, etc.) are sown in these beds.

Level beds: The surface of this bed is perfectly flat or has a slight camber. Stones, wood or a line of pucca bricks are placed at the edges of bed to prevent crumbling in dry season Germination bed, transplant bed, storage bed, seedling bed and cutting bed are the other kind of beds used in nursery for seedling stock preparation

Plant Propagation

- For propagation, framed structures such as green house, poly tunnels, culture room, hardening chamber and mist chamber are some important structures.
- A greenhouse is a framed, infrastructure covered with a transparent material in which crops can be grown under at least partially controlled environment.
- Various designs of greenhouse viz., shade net house, plastic film green house, glass house and natural green houses may be designed according to the need and resource availability.

Shade Net House: A shade net nursery usually has 20 m x 10 m dimensions. It is erected using GI pipes as a support. UV stabilized HDPE green or black colour shade net of 50 to 75% shade intensity is used to cover the nursery area at a height of 6.5 feet. Wire grid is provided at the top of the structure as support for shade net. To prevent insect entry, 40 mesh UV stabilized nylon insect proof net is fitted on all the four sides of the nursery. Provision is also made to pull polythene sheet over the pro-trays in the event of rainfall by way of making low tunnel structure. For preparing low cost polytunnel structure, 3/4“ LDPE pipes and 400 gauge UV stabilized polyethylene sheet are used. Sometime bamboo poles and polysheets may also be used.

Glass/Greenhouses: **Glass house is preferred when the greenhouse is to be placed against the side of an existing building. It makes best use of sunlight and minimizes the requirements for roof supports. Consolidation of interior space reduces labor, lowers the cost of automation, improves personnel management, and reduces energy consumption. Glass greenhouse is seldom used today because they are not adaptable to automation. The construction cost of glass house is more than that of plastic film greenhouses. Several styles of glass greenhouses are designed to meet specific needs.**

How to Assess Quality of Seedlings?

Nursery is an area where young/infant seedlings are maintained under intensive care for up to their planting. Quality seedlings production starts from the collection of quality seed, nursery establishment and maintenance after its germination. Even though quality is a qualitative gradable trait it can be measured indirectly by its correlation with growth, productivity, vigor and quality index. If the quality of a specific group of seedlings is to be assessed, destructive sampling through random selection of some seedlings of the group and computing Dickson Quality Index (DQI) as below is quite useful.

$$DQI = \frac{\text{Total seedling dry weight (g)}}{\{\text{height (cm)} / \text{stem diameter (mm)}\} + \{\text{shoot dry weight (g)} / \text{root dry weight (g)}\}}$$

The limitations of this index are:-

- It will be useful to evaluate the quality of even age seedlings; comparison of different age groups doesn't exist DQI will be derived after destructive sampling.
- Hence, its implication on live seedlings may be suitable only for academic purpose

THANK YOU…