

HRT 504
LECTURE 1
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TOPIC: DEFINITION AND IMPORTANCE OF NURSERY.

What is a nursery?

A nursery is a place where young plants are raised under intensive management for later transplanting into the field. Many horticultural crops can be grown insitu but, experience has shown that raising seedlings in the nursery has a number of advantages. These may include –

- 1) Economy of propagules
- 2) Intensive care for the seedlings – protection against animals, diseases, insects and rodents, regular maintenance practices, watering / irrigation and manuring in the nursery.
- 3) Raising seedlings in the nursery affords selection of vigorous and disease-free seedlings for transplanting into the field.
- 4) Ease of genetic activities.
- 5) The nursery allows for a better medium of growth for the plants than when directly seeded on the field.
- 6) Nursery affords ease of carrying out propagation techniques like, budding, grafting and even marcutting / air-layering.

However, the disadvantages of raising seedlings in the nursery before transplanting into the field include –

- 1) Increased cost of production of a particular crop.
- 2) Specialized labour requirements in the nursery, especially skilled budders and grafters.
- 3) Skilled personnel required for transplanting operations.

Types of nurseries.

Types of nurseries depend on the size, scope and investments put in place. Therefore, there are 3 types of nursery under 2 groups –

- 1) Temporary / shifting nurseries –
 - a) Peasant nursery: These include spots / places where peasant farmers raise tree crop seedlings like cocoa, kola, coconut, citrus, coffee, mango or vegetables. They are

normally located within the compound or along river banks, streams, swamps or family bathroom sheds or any other place with regular source of water. The site is normally under brushed leaving the trees standing for shade provision. The soil is loosened with hoes, seeds sown and covered with palm fronds. Little care is given to the nursery materials. Such a nursery can be shifted at any time.

- b) Intermediate nursery: An improved type of peasant nursery. They are established very close to field in order to avoid the cost and attendant problems on long distant transportation of seedlings. Here, there are no permanent installations and it can be used for one or more seasons. It can also serve as a resting station for transported seedlings.
- 2) Permanent / Standard / Central nurseries: Permanent nurseries are larger and more intensively managed. Although, proximity to field is important, but centralization with respect to the total area the nursery is expected to serve, nearness to source of labour and supervision minimize transportation cost in the long run and thus bring greater economic benefits.

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LECTURE 2
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TOPIC: FACTORS OF NURSERY ESTABLISHMENT.

Selecting a site for permanent nursery is a difficult task. This is because the degree of success achieved in the production of nursery plant materials is largely dependent on careful study and objective judgment on the site. Thus, the following factors must be considered –

- 1) **Water supply:** Water is of prime importance in any successful nursery management. The nursery must be sited near an adequate supply of water. Therefore, in selecting a site, the amount and quality of water available during the period of low water table and extreme drought should be ascertained if possible. This is because the highest water demands by seedlings is during these periods and particularly important in the drier agroecological regions.
- 2) **Soil and topographical features of the proposed site:** A good soil is a prerequisite to the success and economy in the production of nursery plants. The soil should be deep, with fine to coarse sandy loam texture, underlain by somewhat stiffer but still permeable subsoil. Good drainage is very essential to carry off excess water from the tropical rainstorm. Such soils found on freely-draining flat ground or on a gentle slope sufficient to permit satisfactory drainage are considered the best sites.
- 3) **Source of labour:** An adequate supply of labour and proper supervision especially when transplanting, weeding and lifting is essential. Whether in temporary or permanent nurseries, labour must be swift and on schedule to ensure success. The problem of recruiting more labour could be very serious where manpower is scarce or alternative employment exists.
- 4) **Protection against winds:** In a savanna ecosystem, protection against wind is very important. Very often, the violent parching winds in the dry season do cause a high rate mortality in nursery stock especially in the exposed part of the nursery. Under such conditions, nursery should be sited preferably in the naturally sheltered areas. When this not possible and the proposed site is exposed to dry winds like harmattan, artificial screens made of mats or coarse cloth are provided round the nursery or screen houses are constructed.
- 5) **Air pollution:** This is very important especially in the industrial areas and where there is heavy traffic. Sulphur dioxide, cement dust and dust from dusty roads do settle on leaves and this detrimental to the growing seedlings in the nursery.

Therefore, the final choice of a nursery site is usually a compromise that favours those factors that ultimately permit future development and higher efficiency in the nursery.

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LECTURE 3
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TOPIC: SELECTION AND PREPARATION OF NURSERY SITES.

Selection of nursery sites:

The size of land to be selected for nursery depends on –

- 1) Morphological characteristics of the plant species.
- 2) Size of the stock to be planted
- 3) The annual production target
- 4) Method of raising the seedlings
- 5) The degree of permanence of the site.

For intermediate nursery, the area actually occupied by the seedlings plus the access roads and storage sheds constitute the nursery area. In a permanent nursery, additional room has to be provided for crop rotation in order to maintain the organic matter and nutrient status of the soil. Where mechanical equipment is to be used, equipment maintenance and storage centers have to be provided for in the nursery.

Preparation of a nursery site:

Major operations in the preparation of a nursery site include –

- 1) Land clearing: Clear-fell for permanent nursery, while under-brushing and selective thinning of trees are the required operations in temporary nurseries.
- 2) Removal of all plant stubbles and / or trash and burn them at a demarcated incinerator. All other debris must be packed off the plot.
- 3) Leveling the site: This should be carried out before laying out operations. This is majorly, not to give room for erosion.
- 4) Laying out of the site in accordance with plan.
- 5) Establishment of windbreaks. These may include leguminous trees because of their immense agricultural advantages. Other shade-providing trees may be used provided such trees can provide required shade density during the dry season / drought outbreaks.

- 6) Fencing the nursery. The entire nursery may be fenced if compelling factors (like theft or marauders) exist in the area. If raising seedlings with epigeal germination, fencing within the nursery may be necessary in order to keep off the rodents that may want to feed on the cotyledons of the germinating seedlings.
- 7) Erection of major installations: These may involve storage sheds, farm house, incinerators, pipes for sprinkler irrigation etc.

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LECTURE 4
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Topic: Nursery management techniques.

Nursery crops require a lot of careful management from sowing time to eventual transplanting into the field. On both operations, they need some shading, adequate watering and freedom from pests. Besides, some species require tending operations like shoot and root pruning, hardening-off, and field storage prior to transplanting into the field.

- 1) Shading: crop species differ in their requirement for shade in the nursery. Some shade-loving crops like cocoa, kola and some vegetables, require a very good shade in order to keep the soil / growth medium moist and the microenvironment cool. The light-demanding crop species, like cashew germinate and develop into vigorous seedlings without shade. Budded and grafted materials and marcots / air-layers require very good shade in the nursery.
- 2) Watering: Immediately after sowing the seeds, the medium must be water thoroughly and must be continuously kept moist. Drying up of the sowing medium for a day may result in heavy losses of the sown seeds. During the germination period, it is important to keep the growth medium moist with light application of water at least twice a day. Timing of watering is equally as important as the amount of water to apply. Watering continues until the seedlings' roots are grown enough to tap soil moisture.
- 3) Weeding: Weeds must be controlled on both germinating and transplanting media if the seedlings are to develop normally. The associated weed species at these stages of growth of the young plants compete for moisture, mineral nutrients and light. If the weeds are left unchecked, they may stunt and even kill a large percentage of nursery stock.
- 4) Root and shoot pruning: Root pruning is carried out on both bare-rooted and potted seedlings. In bare-rooted seedlings, root pruning is carried out where it is desired to retard shoot growth or to change rooting habit of tap-rooted species by promoting the development of lateral roots. Root pruning involves severing the tap root and / or lateral roots as well. By so doing, greater lateral roots are encouraged. The new root system enables the plants to withstand harsh conditions much better when transplanted. Shoot pruning is also practised in some areas as a means of checking the growth of seedlings that tend to grow tall, thin and weak.
- 5) Nursery soil management: Typical crops of the tropical nursery stock take a lot of nutrients out of the soil, sometimes much more than equivalent field crops. The greater number of seedlings produced per hectare makes the total nutrient requirements per hectare of nursery soils very high. The high rainfall and copious artificial watering required by nursery plants for proper growth and development often leads to additional

nutrient losses by leaching. Stable soil structure and proper nutrient supplementation programmes keep soils in the nursery in good physical and chemical conditions to sustain economic production of seedlings in a given piece of land.

- 6) Maintenance of soil fertility: The nutrient elements lost from the nursery soil by cropping, leaching and some other ways are most economically replaced by adding chemical fertilizers. The primary aim of doing this is to achieve optimum plant response as over-fertilizer application is not only wasteful but dangerous. The excess is subjected to leaching and volatilization and this could be destructive to seedlings as a result of toxic accumulation. Therefore, effective fertilizer application involves finding out what nutrient elements are lacking in the soil and applying them without injuries to the seedlings or soils.
- 7) Maintenance of good physical condition: Achieving and keeping a good physical conditions of the soil especially in the standard nurseries, is more complicated than maintaining its fertility. This usually requires some systematic increase in organic matter content of the soil and continuous protection of the soil from insolation, erosion and caking-up or crust formation as well as minimization of intermingling of sub-soil and the top-soil layers during bedding, filling of bags and weeding.
- 8) Soil conservation: Although the productive capacity of the soil may be drastically reduced by destruction of soil structure and excessive loss of nutrient elements, but, the most serious problem may be caused by erosion. Soil nutrients may be easily replaced, soil structure can also be easily replaced by addition of organic matter, but, loss of top-soil cannot be easily and rapidly remedied. Soil conservation measures include the use of cover crops, mulching, minima tillage, proper bed orientation and windbreaks.

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Topic: fruit tree propagation

This involves practical exposure of the students to both sexual and asexual methods of propagating fruit trees. This practical exercise takes place at the nursery site of the Department of Horticulture.

Budding, grafting, marcotting / air-layering are practically demonstrated to the students using seedlings of cocoa raised by the students. Matured cashew trees are used for marcotting operations.

Every student does his / her own as a practical component of the course.