Training Module No. 10

One Day Training Programme on Forest Nursery Technique

Date :_____ **Venue**: Preferably a Departmental Nursery

Participants: 30 Persons

Registration of Participants (30 Minutes Prior to the Start of First Session)

- Team members of Partner NGOs.
- VSS members involved in direct implementation of the scheme.
- Concerned forester and forest guard.

Objectives of the Training

1. The objective is to enhance and improve conceptual and practical knowledge on development of forest nurseries and techniques involves in forest nursery management.
2. To plan for raising quality planting materials for raising plantation.

Training Outcomes

1. Participants will have clear understanding of various steps involved in nursery development and maintance.
2. The participant will be able to develop nursery for different forest species.

Registration of Participants (30 Minutes Prior to the Start of First Session)

Pre-requisite for this Training:

- The VSS should be selected prior to the training(Three members from each VSS)
- Microplan should be ready with information about the species to be raised.
- A demonstration site for the nursery should be selected for the training.
- The areas for plantation with the species to be planted should be finalized as per the microplan.
- Number of seedlings needed to be planted (species wise) should have finalized.
- List of participants (VSS members) to function as working group should be selected.
- Site for nursery has been identified planned to cater to one or more nursery sites.

Training Methodology: On the site Demonstration of Nursery Techniques.

Materials and Aids Required

Fencing materials: Brushwood and other locally available fencing materials.

For bed preparation: Spades, (small & large), pick axes, Wooden hammer, Ropes, cotton or steel tape, Wooden pegs, Shovels', Khurpa, sickle, axes, Wooden planks, bricks, stones, bamboo's splinters , Agro shade net, Polythene sheet, Poly pots, watering cane, container or glass jar for storing seed etc.

Details of Session Plan

Duration (Min)	Key Steps/ Key activities	Method	Aid/ Materials Required
Session 1:			
60	**Introduction about the nursery** 1. SITE SELECTION: 1.1 Location 1.2 Water 1.3 Topography and drainage 1.4 Soil 2. LAYOUT OF NURSERY 2.1 Shape and Size: 3. ESTABLISHMENT OF NURSERY 3.1 Site preparation 3.2 Types and size of beds 3.3 Sunken beds 3.4 Raised beds 3.5 Preparation of seedbeds	Lecture/Interaction and Field demonstration	• Field note book, Pen etc. • Handouts • Dry-wipe Board with Markers
Session 2: Brief on seed and their treatments			
60	4 SEED COLLECTION AND STORAGE 4.1 Whether to buy or to collect seeds 4.2 Estimating seed quantities 5. PRE-SOWING TREATMENT OF SEEDS 5.1 Boiling water treatment 5.2 Hot water treatment 5.3 Cold water treatment 5.4 Wet and dry method 5.5 Cracked shell treatment 5.6 Pre-sprouting treatment	Lecture/Interaction and Field demonstration	• Field note book, Pen etc. • Field equipments • Handouts
Session 3: Brief on Plant Propagation			
60	6 SEED SOWING 6.1 Direct sowing of seeds in polythene bags 7 PROPAGATION OF PLANTS BY CUTTINGS 8 PROVIDING SHADES IN THE NURSERY 9 MULCHING 10 PREPARATION OF POTTING MIXTURE 10.1 Filling of polythene bags 10.2 Transplanting of seedlings 10.3 Dibbling	Lecture/Interaction and Field demonstration	• Field note book, Pen etc. • Field equipments • Handouts • Dry-wipe Board with markers

Session 4: Care and maintenance			
60	11 AFTER CARE OF SEEDLINGS 11.1 Weeding 11.2 Watering 11.3 Control of diseases 11.4 Shifting and grading of seedling 11.5 Pruning 11.6 Hardening off of seedlings 11.7 Replacement of dead/damaged seedling	Lecture/Interaction and Field demonstration	• Field note book, Pen etc. • Field equipments • Handouts
Session 5: Transportation and Nursery Record keeping			
60	12 TRANSPORTATION OF SEEDLINGS 13 PLANNING AND RECORD KEEPING/NUSERY JOURNAL 14 CALENDAR OF OPERATIONS	Lecture/Interaction and Field demonstration	• Field note book, Pen etc. • Field equipments • Handouts
Feedbacks and Vote of Thanks			

Session 1: Introduction

Seedlings are the basic pre-requisite of an afforestation or reforestation programme. The success of plantations depends primarily on the quality of seedlings and the care taken for raising them. A nursery can be defined as the site or place where quality seedlings are produced. Nurseries can be permanent (also known as central or main nursery), or temporary (also known as site nursery, field nursery, or flying nursery), depending upon the requirement of seedlings for the plantation programme. In a continuing programme that is likely to go on for more than five years, it is desirable to have at least a few permanent nurseries with proper infrastructure.

However, in case of any afforestation project lasting five years or less, temporary or semi-permanent nurseries can be established in which the cost can be reduced by dispensing with some of the infrastructure elements such as construction of temporary or semi-permanent structures for compost unit, stores and other nursery sheds, fencing with locally available materials and irrigation facilities. The establishment of a nursery and raising of quality seedlings is a technical process. It has been described systematically in the following steps:

1. SITE SELECTION:

It is one of the most important aspects for the establishment of a proper and quality nursery. One has to consider not only the physical aspects for the selection of the site but also the end use of the seedlings. Following points may be kept in mind while selecting a site for the nursery.

1.1 Location

The site should be centrally located with easy access for transportation of seedlings. It should be close to the area where seedlings are to be utilized. The site should be as square as possible. Sites used earlier for agriculture may be avoided and preference be given to former forest sites where weed problems will be less and beneficial mycorrhizae forming fungi are often endemic. Further, the site should be open. i.e without any tree growth.

1.2 Water

Enough water should be available especially during the dry season. A natural source of water/perennial source at a higher level will be cheaper, as it can be tapped by gravity. If no natural source of water is available, ground water may be used. It is estimated that the water requirement is minimum of 2,000 lit per day during summer, for every 1, 00,000 seedlings. Requirement of water will be somewhat less for moist or cold areas.

1.3 Topography and drainage

The area should be almost flat with good drainage. This can be managed by providing gentle slope (5 degrees) and channels should be dug to drain out excess water from the nursery.

Nursery site should not be selected close to the edge of a high forest or in the middle of the grassland.

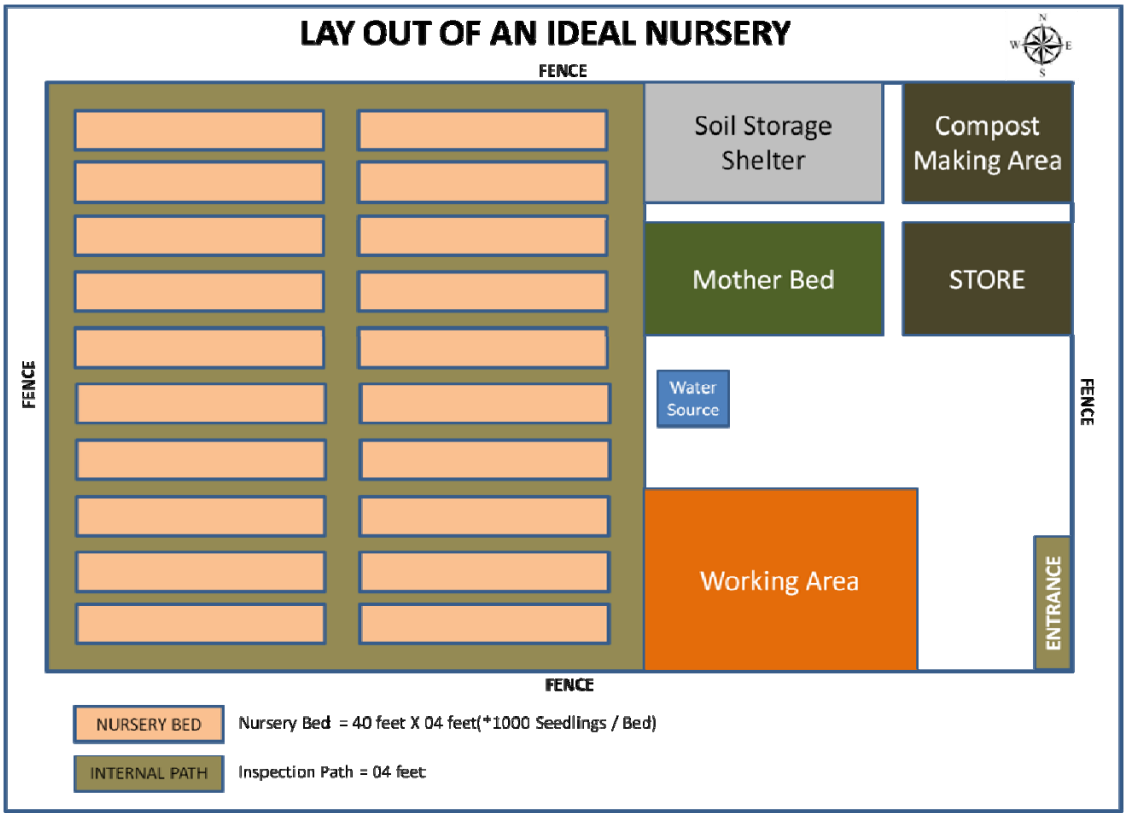
1.4 Soil

The ideal forest nursery should have sandy loam to loamy texture. Sandy soils may be given preference over heavy soils. Soil should have pH ranging from 5.5 to 7.5, moderate fertility, with a minimum of 2.5% organic matter. The higher the organic matter content of the nursery soil, the better it is. A site with high organic matter content ensures good retention of nutrients and water and may improve the working properties of the soil. The depth of soil should not be less than 25 cm. It is not always possible to get good soil everywhere. Under such circumstances, one has to get extra soil, sand as well as farm yard manure from outside; therefore, location of nursery should be close to such areas.

2. LAYOUT OF NURSERY

2.1 Shape and Size:

As far as possible the nursery should be of a rectangular shape; so that it can be divided into smaller nursery beds of rectangular shape, leaving space for roads, inspection paths, dumping of manure, hut for Mali and space for people working in the nursery to rest during rain or intervals.



The requirement of the total area for the nursery can be calculated by adding together the area required for mother beds, polypots, entire plant/root shoot cuttings and beds required for rooted cuttings. Another 40% area may be added for making the path. Area will also increase if seedlings are kept in the nursery for a longer duration, especially for raising tall seedlings. Area required for sheds, water tank, storage of seed, manure etc. should also be kept in mind.

3. ESTABLISHMENT OF NURSERY

3.1 Site preparation

The site for nursery should be cleared properly by removing all stumps, roots, lops and tops. Stones collected from the site may be used for metalling the main nursery road/ inspection paths. Thorough ploughing or hoeing to a depth of 30 cm should be done, especially in places where plants are to be raised in the nursery beds. The soil should be levelled to form an even slope or, if a site is flat, should be slightly domed. As far as possible, removing of top soil must be avoided. Drainage channel around the beds should be dug as early as possible to avoid soil erosion. Drains should be dug on both sides of the paths and connected to main drain. In plains, drain should be adequately sloped.

3.2 Types and size of beds

Nursery beds are prepared to germinate seeds, keep polypots and transplant pricked out seedlings. In the plains, beds of 40 x 04 feet size are generally prepared. However, size can be changed depending on the availability of the area. Width of beds should not be more than 04 feet otherwise watering and weeding especially in the middle part of the bed becomes a problem. The beds should be oriented in East-West direction in the plains and should follow contours in the hills.

3.3 Sunken beds

Sunken beds are used in arid areas and hot places to protect young seedlings from hot winds, and also to reduce the rate of evaporation, thus reducing the consumption of water. These beds are made 15 cm deep from the ground level.

3.4 Raised beds

Raised beds are generally used in moist areas. Such beds are raised 15 cm above the ground to improve drainage and promote warming of seedbed. Beds are given side supports of bamboos, twigs, bricks or other locally available materials.

3.5 Preparation of seedbeds

The plot where seedbeds are to be prepared must be ploughed and levelled and sloped (1 to 3%), depending upon the texture of soil (less slope for sandy soils). It should be ascertained that the soil in the seedbed is light. If necessary, sand and soil (1:1) may be mixed so that the root of seedlings can break through when germinate, and this will also be helpful when plants are lifted for pricking. The seed beds should not be filled in completely, so as to avoid the washing away of top soil and seed. The surface of the seedbed should be made firm by sprinkling water and then using a wooden plank. These beds are generally used for the following reasons:

- To provide a small reserve of seedlings which can be used to replace direct seeded plants that did not germinate.
- For sowing seeds which germinate slowly and unevenly, like teak.
- For the seeds whose quality is not known.

Session 2: Brief on seed and their treatments

4 Seed Collection and Storage

4.1 Whether to buy or to collect seeds

Seeds can be purchased from reputed nurseries or collected from known stands of trees. Seed collection is the best approach since the quality and provenance of seeds are known. Seed sellers may, of course, also offer good quality seeds and sometimes even better than what one has at hand in the local stands of trees. Moreover, all required species may not be available locally. In any case, it is better to divide seeds into two categories those that are used in the main afforestation programme and are locally available and those which are raised for distribution to the general public and usually not available locally. The former should be collected from healthy middle-aged trees of good quality and the later can be purchased from the reputed commercial nurseries or suppliers. Different species have different seeding time; therefore it is necessary to have a time table for collection or purchase of seeds. Seed viability and dormancy are important factors, which decide the sowing time. Species with very short seed viability must be sown immediately otherwise the germination percentage will go down drastically. Seeds with long viability should be sown when temperatures are moderate, i.e. between July to October and February to March. Whether the required plants are to be of six months, one year or one and a half year age will also affect the sowing time. Following precautions are required to be followed at the time of seed collection:

- Only fully matured seeds should be collected as the unripe seeds of most species do not germinate e.g. Bahera, Arjun etc.
- Mother trees should not the damaged or heavily lopped for seed collection, otherwise such tree may die or stop seeding.
- Seeds of pulpy fruits can be collected by rubbing them in water followed by washing, drying cleaning respectively e.g. Bel, Kadam etc.
- The collected seeds must be dried properly before storing to avoid any possibility of its damage. However, excessive drying should be avoided.
- Properly treated seeds should be stored in a place of good ventilation and free from moisture to safeguard them from decaying or losing viability.

4.2 Estimation of seed quantities

It is necessary to compute the required quantities of seeds. Factors like germination percentage, number of plants to be raised and amount of wastage involved, all affect quantity of seeds. It is convenient to have a seed weight chart depicting the species wise details of the number of seeds per kilogram to make it handy while computing the quantity of seed required. Per kilogram number of seeds, collection period, viability and pre-sowing treatment of some of the common species are as follows:

Species	No. of seeds per kg	Best seed collection period	Pre-sowing treatment	Viability	Germination per cent
Acacia nilotica	7000- 11000	April- June	Fresh, 40-50 min H_2SO_4, scarification	> 2 yrs	88
Pterocarpus marsupium	1500-1600	April-May	Hot and cold water treatment	2 yrs	75
Ailanthus excelsa	9500	March- June	De-winking, Water soaking 12-24 hrs	One year	70
Albizia lebbeck	9200	Nov-Dec-Feb	Water soaking for 24 hrs	4-5 yrs	40-60
Gmelia arboria	1500	March-April	Overnight water soaking	6 months	70
Azadirachta indica	1750- 4000	June-July	Fresh, De-pulping and sowing	2 weeks	50
Dalbergia Sisso	10000	Feb-March	cold water treatment	One year	70
Casuarina equisetifolia	7,60,000	June-Dec	Fresh, Mixed with ash and BHC	1 yr	70
Eucalyptus hybrid	>3,57,000	Sep-Dec	Fresh, Mixed with ash/sand and BHC	2 yrs	90
Hardwickia binata	3900	April- May	Fresh, No treatment	1 yr	60-80
Jatropha curcas	1200- 1800	Feb-Mar,Oct-Nov	Fresh, Water soaking 12-24 hrs	1 yr	>90
Leucaena leucocephala	8000- 10000	April	Hot water treatment for 2-3 min	2 yrs	90
Mesua ferra	230	Aug- Sep	24 hrs cold water soaking	4 months	70
Pongamia pinnata	800-1500	Mar-May	Fresh, No treatment	12 months	80

Simarouba glauca	1000- 1500	Jan-April	Fresh, No treatment	1 yr	>80
Syzygium cumini	1200	June-Aug	Fresh, No treatment	1 month	50
Tamarindus indica	1000- 1200	Oct- Dec	Fresh, 15 min. H_2SO_4 scarification	3 yrs	>60
Tectona grandis	2500- 3000	Mar- April	Alternate wetting and drying for 7 to 10 days	<2yrs	30-60

5. PRE-SOWING TREATMENT OF SEEDS

Seeds contain tiny, fragile plants that live under the hard seed shell. They need water to germinate. Some seeds have such a hard shell that water cannot easily enter the seed to help it sprout.The Pre-sowing treatment of seeds is essential to facilitate germination, therefore, all plants will be of the same size and will be ready for out planting at the same time. Following methods can be used for the treatment of different seeds to enhance their germination:

5.1 Boiling water treatment

This method is generally used for the species which have a very hard coat e.g. Acacia and Prosopis. Water is boiled in a pan and seeds are kept in the water only for 1 to 2 minutes. After 2 minutes, pour off the water and replace it with the cold water. Let the seed soaked in cold water for 2 to 3 days or until the seed swells. Seeds are sown in polypots immediately after the treatment.

5.2 Hot water treatment

This method is generally used for the species which have a hard shell e.g. Albizia, Cassia,Teak, Leucaena, Sesbania, Samanea etc. Sufficient quantity of water is boiled in a container. Once it is boiled, water is taken off from the fire and allowed to cool for about 10 minutes. After that, the seeds are poured into the container and kept as such for 2 days or until most of the seeds have swelled. The water of the container can be changed everyday and seeds are sown immediately after the treatment.

5.3 Cold water treatment

Some seeds need lots of water to facilitate germination. Others may have chemicals inside the seed which must be removed before the seed can germinate. Examples are Citrus, Gliricidia, Neem, Sirisa,Simili, Sunari,Asan.etc Seeds are kept in sufficient water for 1 to 2 days. Water can be changed after every 12 hours and seeds that float on the top must be discarded. Plant all swollen seeds immediately.

5.4 Wet and dry method

This method is generally used for teak seeds. Seeds are soaked in the cold water for one day. Next day, they are spread in the sun to dry for at least 1 day. When dry, they are again

soaked for overnight. The process is repeated for about 20 to 30 days after that seeds are sown in a germination bed.

5.5 Cracked shell treatment

The method of seed treatment is generally used for the seeds which are contained within a nut. When the shell is cracked, water enters the seed and it germinate immediately. The nuts are kept on a solid surface and hit with a piece of wood or a small hammer. One has to be careful not to hit too hard to crush the seed inside. Once the seed is cracked, sow it immediately.

5.6 Pre-sprouting treatment-This method is used for the seeds which have a very short viability e.g. neem. Seeds are spread between the pages of newspaper. Wet the paper and put them in the shade. Seeds start germinating and must be transplanted immediately when the roots emerge.

Session 3: Brief on Plant Propagation

6 SEED SOWING

Sowing can be done either by broadcasting/scattering, or in lines along the width of the bed. Broadcasting method is used for minute seeds such as Eucalyptus. These are generally mixed with equal amount of fine sand to facilitate uniform seed distribution. Better germination can be obtained if such seeds are sown in small wooden boxes or other containers, which can be kept under controlled environment, so as to protect seeds from excessive heat, rains etc. The small and medium sized seeds are sown in lines or drills 5 to 10 cm apart, the seed is covered with sand or sieved soil and gently firmed.

Sowing depth is crucial for the production of a uniform bed of seedling. Best germination is obtained in the case of small and medium sized seed, when they are sown as deep (0.3 to 0.6 cm) as necessary to cover them. The general rule is that the upper surface of the seed should be at a depth equal to the diameter of the seed. Seed bed density and spacing also play an important role in germination. Too dense sowing may result in damping off disease. Mulching by covering the seedbed with dry grass or paddy straw is helpful, as it helps retain moisture, reduces weeds and improves germination. After germination, the shade should be removed gradually in stages and the mulch should also be removed.

6.1 Direct sowing of seeds in polythene bags

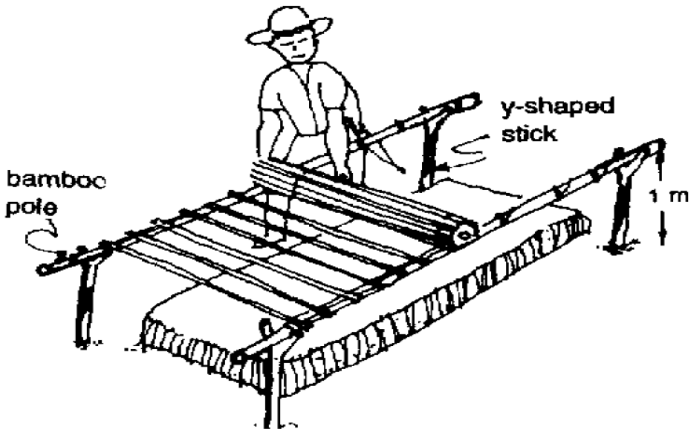
Sometimes seeds are directly sown in the polythene bags. In such cases the bags should be completely filled with soil mixture and left standing for few days, so that the soil settles. The bags should be watered well the day before sowing. Two seeds should be sown per bag and then covered with sand or with a mixture of sand and soil. Seeds directly sown into bags normally attain more growth compared to pricked out seedlings and become ready for planting much earlier. After germination, only one healthy seedling per bag should be retained and the other be pricked out.

7 PROPAGATION OF PLANTS BY CUTTINGS

Seedlings are generally raised from seeds but, in some cases where seed is difficult to get or germination is poor due to small size of seed or infertility, plants are raised by vegetative methods. Cuttings of sections of roots, stems, branches or twigs, which are taken from suitable mother trees. A light, loose rooting medium should be used for this purpose. The soil should be dug 30 cm deep and sand and compost mixed with it. Cuttings of 5–10 mm diameter and 15–20 cm length should be obtained from young vigorous trees. The leaves should be stripped off the cuttings to reduce the transpiration. It is better to keep such cuttings for rooting into small poly houses to maintain humidity and temperature.

8 PROVIDING SHADES IN THE NURSERY

Most of the tree species need shade in the early stage of germination while the seedlings are still tender. The shade is more important during summer, and had a great effect in increasing the survival of seedlings. Dry grass, bamboo mat, palm leaves or straw can be used as shading material but tin sheets should be avoided. Shade should be slanting towards North-South to protect the seedbeds or seedlings from the hot sun.



9 MULCHING

It is also beneficial, before and after the monsoon, to protect the surface of seedbeds against becoming hard, and thereby inhibiting seedlings in breaking through resulting in delaying or leading to poor germination.

10 PREPARATION OF POTTING MIXTURE

The potting mixture should be prepared with meticulous care and control. A fine mixture of soil, sand and manure in the ratio of 2:1:1 should be prepared. Before mixing, the soil and sand should be sieved and pebbles and other undesirable material separated. The manure should not be sieved but rubbed with hands to make it fine and twigs and other impurities should be removed. Insecticides in the prescribed proportion should be mixed in the mixture. The main characteristics of a good potting mixture are:

- It must be light in weight
- It must be well drained and not hold too much water
- It must be free from insects, diseases and weed seeds

- It must not contain clay soil or large amount of ashes and
- All materials must be well decomposed.

10.1 Filling of polythene bags

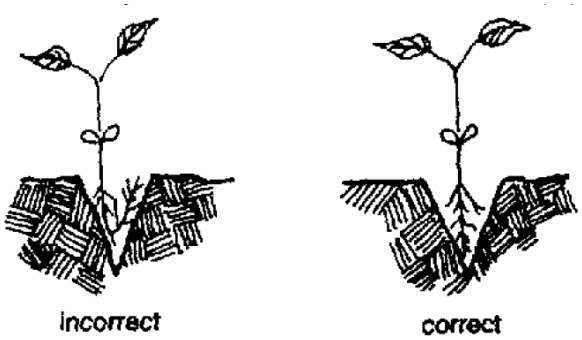
The polybags should be filled with the potting mixture. After first fill the bags should be struck on ground to let the soil settle in and firm in and then the pot should be filled again. If loosely filled, soil will settle later and make polybags limp, resulting in dislodgement of roots and heavy mortality of plants during handling. At least half to one inch from top of the pot should be kept empty to avoid spillage. Filled polybags should be placed erect within the sunken beds meant for the purpose.

10.2 Transplanting of seedlings

Plants sown in germination beds have to be transplanted into polybags. Transplanting age and time vary, but on an average, it has been seen that earlier transplants are more successful. Too big plants in germination beds may have their roots entangled, and disentangling them may cause seedlings to die. As a general guide to transplanting age, 20 to 30 days (excluding germination period) is adequate for most of the species. For transplanting, a scoop may be used to lift a group of plants with soil. From this soil the individual plantlets can be separated and inserted into holes made in the polybag soil by thrusting a sharp punch. The depth of the hole should be equal to the length of the root of the seedling, so that the root does not bend while being pushed into the hole. After inserting the plantlet roots, the hole is closed over up to the collar of the plantlet. The transplanting work should be done in the afternoon so as to avoid mortality of plants in hot sun. A bed of polybags is gently irrigated after all the pots have been transplanted. If transplanting is done in hot weather, proper shade should be provided over the beds to prevent the tender seedlings from getting scorched to death.

10.3 Dibbling

It is the process of planting the seedling in the polypot from the mother bed. Care should be taken during planting the young seedling to avoid the root coil.



Session 4: Care and maintenance

11 AFTER CARE OF SEEDLINGS

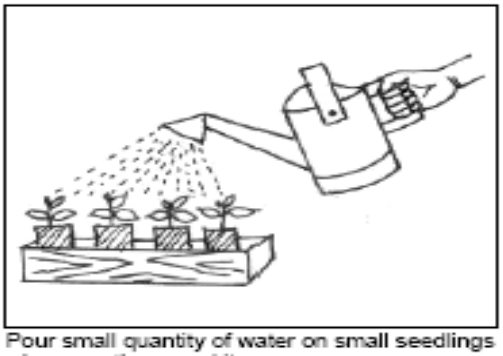
Young seedlings are vulnerable to many factors and major losses can occur if these are not taken care of. Seeds may not germinate or may be lost to predators or diseases, if proper care is not taken. In addition, seedlings may have to survive pricking out shock, dry conditions, heavy rains and hail storms, scorching sun, high temperature and weed competition. Seedlings require after care till they are planted out in the field. This includes weeding, watering, manuring, hardening, protection against adverse climate, diseases and insect pests.

11.1 Weeding

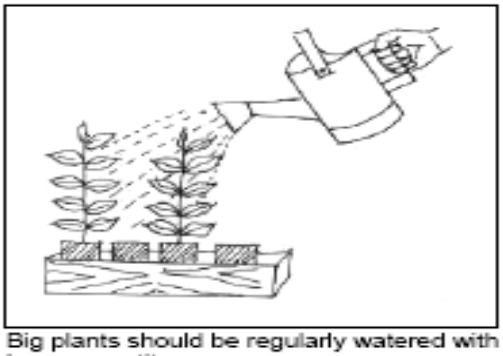
Weeds come with manure, clay or sand transported from outside. Sometimes undesirable seeds get mixed with the seed sown. It is a simple matter to remove weeds by pricking them out. This operation should be carried out at the earliest opportunity after the weeds have become visible. If two seedlings of the species sown have come up in a polythene bag, one of these should be immediately pricked out and transplanted into another polybag. It is desirable for regular weeding in nursery. In the mother beds, it is also desirable to hoe the soil periodically, apart from removing the weeds.

11.2 Watering

The soil surface of the seedlings should not be allowed to dry. As a rule, finer textured soils require more frequent watering than coarser ones. Seedbeds and transplant beds should be watered twice a day. Too much watering during germination, however, is not desirable. Excess watering promotes the growth of fungi by decreasing the temperature and increasing soil moisture.



Pour small quantity of water on small seedlings whenever they need it



Big plants should be regularly watered with larger quantity

To prevent damage, the soil surface should be kept cool by proper watering. There are a number of methods of watering. The one most commonly used is sprinkling water by a rose can or through hose.

Following points must be remembered while watering in a nursery:

Do not water at a fixed time each day. Water when the plants need it,

- All species do not require the same amount of water,
- Small seedlings don't need much water,
- Large plants need more water and more often,

- Plants growing in the shade need less water,
- Plants growing in the sun need more water, more often and
- Plants need more water, often on windy days.

11.3 Control of diseases

Periodical spray of insecticides and fungicides is essential to control insect and fungal diseases in the nursery. It should be used immediately when disease or insects appear according to the manufacturers' instructions.

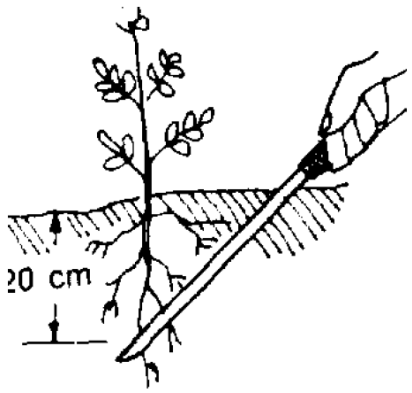
Remember the following tips while using them:

- Proper doses should be prepared by carefully reading the label or guidelines.
- Always provide protective clothing, masks, gloves and goggles to the person spraying the pesticide.
- Never mix insecticides and fungicides together in the same sprayer.
- Never eat, drink or smoke while spraying.
- Never use pesticide containers to store other things.
- Extra pesticides should be disposed of by burying them in a hole far from rivers and wells.

11.4 Shifting and grading of plants

It is essential to provide adequate growing space in the beds for speeding up the growth of plants in the nursery. Therefore, the surplus plants should be removed carefully and kept in new beds. The beds should be irrigated before the shifting and grading operations. While shifting, plants should be graded according to their heights and put in the beds grade wise.
While shifting the polythene bags, the roots of the plants protruding outside the bags should be cut with sharp scissors. It is better to keep these bags over a polythene sheet to avoid roots penetrating the soil. However, keeping such bags on mounted beds gives better result and avoids root coiling by facilitating pruning of roots if necessary.

11.5 Pruning



Some species grow very fast in the nursery. Sometimes tall seedlings do not have enough roots to support the many leaves. When these seedlings are planted in the field, they may grow slowly or even die because of roots cannot supply enough water to the leaves. In order to avoid this problem, cut off the tops of seedlings that have grown too tall. Use a sharp knife to trim the tops of these species. For example- Casuarina, Eucalyptus, Leucaena, Gliricidia, Neem, Sesbania etc. Root pruning is also essential to avoid deep penetration of roots in the soil and in the process, the plant gets hardened. Pruning of roots helps in the development of tertiary roots.

11.6 Hardening off of seedlings

Life is easy for the plants in the nursery since they receive good care there. However, once planted in the field, life is much harder for them. They may not have enough water or food to live very well. Therefore, seedlings must be made tough to survive well in the field. This is called hardening off. It is achieved by gradually reducing the frequency of watering before one month of planting. However, care must be taken that seedlings are not burnt in the process.

11.7 Replacement of dead/damaged seedling

Care should be taken to replace the dead or damaged seedling immediately by sowing of fresh seed or replacing the dead or damaged seedling from the existing seedling beds.

Session 5: Transportation and Nursery Record keeping

12 TRANSPORTATION OF SEEDLINGS

Seedlings are very delicate and should be handled properly. The polypot seedlings should always be held by the bag and never by the plant itself. Seedlings should be watered thoroughly before carrying them to the field. Seedlings should be transported in the trays or baskets and not tied in bundles with strings or grass. The seedlings should be placed straight and watered properly to avoid mechanical shock during long distance transportation. In case of stumps, they should be bundled, wrapped with a wet sack and transported to the field.

13 PLANNING AND RECORD KEEPING/NURSERY JOURNAL

Planning of a nursery should be done at community level. First visit the planting sites and discuss the reason for planting, and the species to be planted. It is better for growing local species with which the people are familiar. The nursery journal is to be maintained properly.

14 CALENDARS OF OPERATIONS

By making a comprehensive calendar that includes all activities for all species, it is easy to see how much labour and materials are needed each season. This calendar forms the basis of the budget. It also indicates when extra labour is needed and materials that cannot be obtained locally must be ordered.

Model Calendar of Operation:

Sl. No	Months	Activities
1	Oct-Nov	Site selection for Nursery, layout and fencing
2	Nov-Dec	Order for polypots and other nursery materials and Explore good seed availability, Arrange for collection of soil, sand and cowdung for soil mixture
3	Nov-Dec	Filling of polypot
4	Nov-Dec	Sowing of Seeds in mother bed as per availability of seeds
5	Dec- Jan	Sowing of Seeds on polypot and transplanting of seedling from mother bed
6	Feb-April	Provide shade in nursery, Weeding, Replacement of causalities and plant extra seedlings in empty pots
7	Feb-May	Application of fertilizer and pesticide
8	April-June	Watering, Grading and sorting of seedling
9	June-July	Prepare seedlings for transport/ plantation

Participant 's Feedback

Name of Training: One Day training Programme on Forest Nursery Technique

Venue:

Date:

1) How far has this training fulfilled your demands?

Completely ☐ Partly ☐ None ☐

2) Please mark your opinions on the contents discussed in the course:

Sl No	Content	I have achieved a clear concept		
		Fully	**Partly**	**None**
1.	Introduction about the nursery			
2.	Brief on seed and their treatments			
3.	Brief on plant propagation			
4.	Care and Maintenance			
5.	Transportation and Nursery Record Keeping			

3) Give √ mark in appropriate box :

Aspects	Very Good	Good	Fair
Training Room Facilities			
Quality of Food			
Lodging Facilities			

4) Mention three things during the course you liked and did not like

	I Liked		I did not like
1.	_____	1.	_____
2	_____	2.	_____.
3	_____	3.	_____

5) Of all contents discussed in the course.

You liked most _____

You disliked most _____

4) Give your overall impression about the training with √ mark.

Very good		Good		Fair		Not satisfactory	

5) If you have any additional comments, write here.

_____
_____
_____
_____

Signature

Name