

NATURAL RESOURCES CONSERVATION AND DEVELOPMENT LEVEL II

Learning Guide -19

Unit of Competence: Assist Nursery Work

Module Title: - Assisting Nursery Work

LG Code: AGRNRC2 M05 0919 LO1-LG-19

TTLM Code: AGRNRC2 TTLM 0919v1

LO 01: Prepare nursery planting beds

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Sieving and preparing Nursery inputs
- Mixing and filling in polythene tubes
- Arranging polythene tubes on beds
- Identifying Limitations and seeking assistance
- Carrying out Seedbed preparation

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to

- Nursery inputs are sieved and prepared for mixture according to organizational work manual
- The nursery inputs are mixed and filled in polythene tubes according to the proper ratio required for seedling production
- The filled polythene tubes are arranged on beds for direct sowing according to the organization manual
- Seedbed preparation is carried out using appropriate tools and techniques in accordance with site plan
- Adjustments are made on seedbed preparation as required to accommodate contingencies in line with site plan intent and organizational requirements

Limitations are identified and assistance sought as required in accordance with workplace procedures

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 and Sheet 4”.
4. Accomplish the “Self-check 1, Self-check 2, Self-check 3 and Self-check 4” in page -6, 9, 12 and 14 respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, Operation Sheet 2 and Operation Sheet 3” in page -15.
6. Do the “LAP test” in page – 16 (if you are ready).

2.1. Sieving and preparing Nursery inputs

Sieving: Soil for seedbeds and for potting should not contain clods, stones, pieces of wood or similar objects. The potting mix ingredients (soil, sand and compost/manure) are passed through a coarse sieve with a mesh opening of 1 cm or, preferably, 0.5 cm. The mesh should be of wire fitted to a metal or sturdy wooden frame of at least 1 m x 1.5 m.

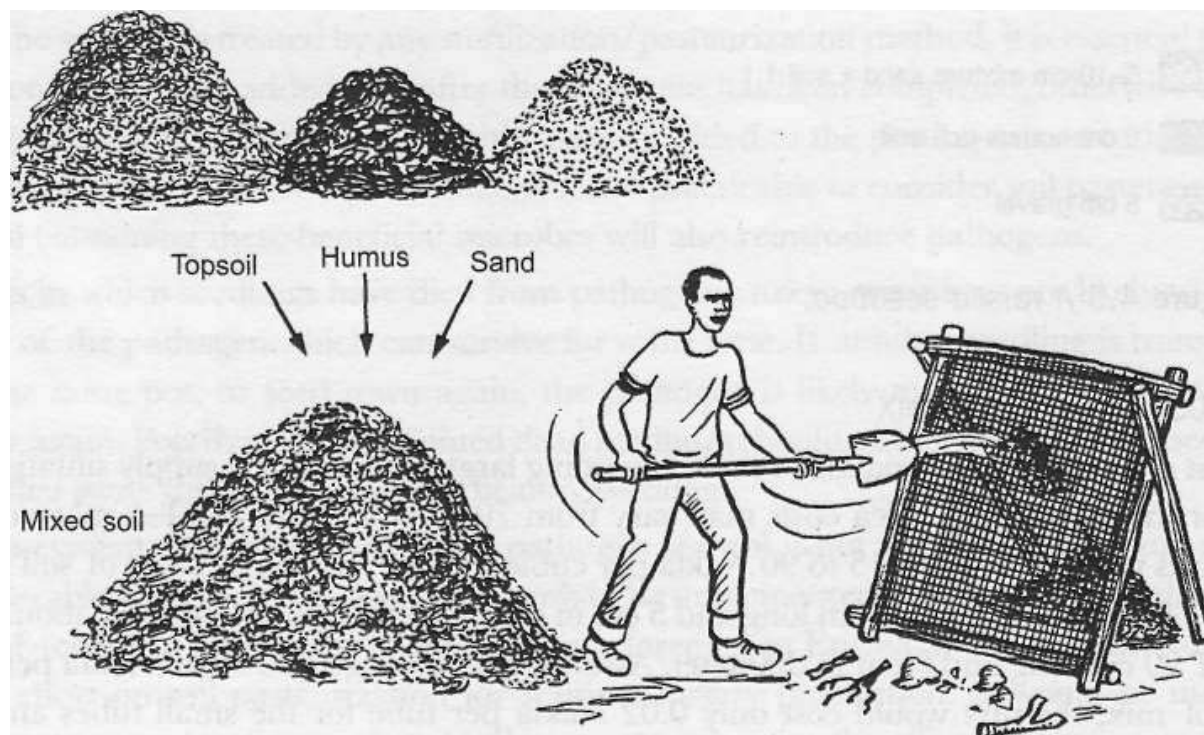


Figure 3 Sieving and mixing potting soil

The **proportion/ratio** of these different soil components to be used varies

- ✓ From place to place
- ✓ The species to be raised, and
- ✓ The availability of soil ingredients



Find out the best possible potting soil using material available nearer to the nursery



Decide on the best mixture/ratio through trial/experiment.



Once the ratio of different soil components are determined, there quire quantity of forest soil, sand soil, compost, local soil and others can be calculated
Parameters required for calculating each components are



Container size (dimension)



Number of seedlings to be produced.



The proportion (ratio) of each component in the total soil mixture.

❖ **Potting method**

Potting is the filling of pots with soil. After the preparation of a suitable potting mix, and having cut endless polythene tubing to the required length, you can begin pot filling. The soil mix should be moist but not saturated to facilitate rapid filling of pots to the required density. The labor and time spent on filling tubes is a major component in the cost of running nurseries and so this task should be carried out efficiently. The use of a simple funnel and scoop (see Figures 4) helps to hasten filling and is widely recommended in labor-intensive nurseries. These tools are especially useful when filling larger tubes such as the most commonly used size in Ethiopia is 7-8cm lay flat tubes & length 12-15cm. During pot filling the lower third of the polyether should be strongly compacted to prevent the soil from falling out of the bottom of open-ended tube and the filling pot stay to the upright position. The upper part should be gently or slowly because roots penetrate easily.

The pot size to be used varies depending on the tree species to be raised from place to place, planting site and to some extent means of propagation and seed size

Funnel: A simple funnel, which can be made from waste metal cans, considerably speeds up pot filling, especially if larger size pots are used. The diameter of the lower end of the funnel should be just a little smaller than the diameter of the tubes to be filled.

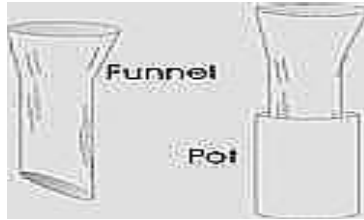


Figure1. Potting funnel

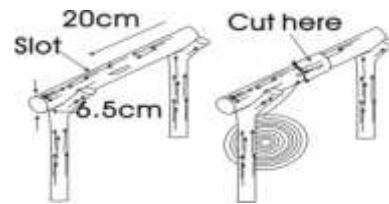
Pot cutting roll: a simple cutting gauge which permits rapid cutting of the tube into pots of standard length (15 or 20) cm. It can be made locally.

- To obtain pots in 20 cm length, the piece of rounded tube has to have diameter of 6.5. cm

Perimeter / circumference of round object is:

$C = \pi d$, $d = C/\pi$, where C = pot length, d = diameter

π = constant ≈ 3.14



Self-Check -1	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is Sieving? (5)
2. What is potting and write the potting method?(5)

¹**Note:** Satisfactory rating - 18points

Unsatisfactory - below 18 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____
2. _____

2.2. Mixing and filling in polythene tubes

Soil mixture can be made by mixing **soil, sand and compost** (FYM) in the ratio 2:1:1 or 1:1:1 to make /prepare suitable growing media. Common components of soil mixture includes: sphagnum or peat moss, sand, bark and saw dust, quarry dust, humus, forest soil, leaf molds, organic matter, and vermiculite.

Properties of a growing medium or soil mix

- ❖ Good aeration
- ❖ Good contact between seed and substrate
- ❖ It should be adaptable to mechanical mixing
- ❖ Good infiltration
- ❖ Free of fungi, bacteria, weeds etc

Soil mixture for potting rooted cutting and young seedling



1 or 2 part sand, 1 part loam soil and 1 part peat moss (or shredded bark or leaf mold)

→ For general container grown seedlings

1 part sand, 2 part loam soil and 1 part moss or shredded bark or leaf mold

Soil mixture for raising tree seedling



3 part agricultural soil, 1 part humus rich soil and 1 part sand

The characteristics of suitable planting media are:

- Firm enough to hold the seeds or cutting in place during germination or rooting
- Ability to retain and supply sufficient moisture to the seed or cuttings
- Porous enough to permit aeration and drain out excess water
- Free from high concentration of salts
- Free from weed seeds, disease and nematodes

Planting media

Soils: mixture of sand, silt and clay (loam soil)

- ❖ Physical properties of the soil
- Soils with good structure
 - Pores large enough to transmit air and water without restriction
 - Soil structure can be improved by
 - Addition of organic matter
 - Root cutting, ripping and raking
 - Pile before burning

Effects of burning the soil

- Destroys much of the organic matter
- Loss of organic carbon, nitrogen and sulphur in the vegetation and litter (if crops are not established after burning)
- Increases in the PH the surface soil



Heating soil may not affect

- The microbial population
- The physical condition of the soil
- The availability of nutrient

➤ **Pot filling**

Use of poly bags/pots for raising seedlings has become very common with a large number of species, because this entails minimum disturbances to the root system, avoids the problem of digging, ease in transportation and gives higher survival.

The sizes of containers are determined mainly by site characteristics of planting area (rainfall, soil fertility) and species characteristics such as seedling vigor. Research result shows that optimum container volume is dependent on ***mainly length than diameter (i.e. for the same volume length has greater effect than the diameter).***

In general,

- ◆ for dry areas, we can use $L \approx 20-25\text{cm}$
- ◆ for areas with abundant rainfall $L \approx 15\text{cm}$
- ◆ The smaller the container, the bigger the likelihood of root cutting.

Quantity of potting soil:

$V = \pi r^2 l n$; Where: r = radius, l = length, n = number of seedlings to be produce

So if the soil mixture is 60% top soil, 30% sand and 10% compost hence, V_1 (top soil) = 0.6V, V_2 (sand) = 0.3V, V_3 (compost) = 0.1V.

Method of potting operation

- ◆ by machines designed for potting (for large scale nursery stock production)
- ◆ manually operated

Filling soil mixes in pots /Containers

- sieve the soil mixture through 2mm mesh to remove clods/stones
- mix the ingredients and turn with shovel
- fill the bag by firmly compacting the lower third of container
- avoid air pockets in containers during the bag fill
- keep the soil mix moist while filling

Placing pots in blocks

The objectives are:

- to reduce bad growth of nursery
- to enhance good root growth
- to create sufficient space for drainage

Placing pots in blocks/ beds

- place pots in an upright position
- leave spaces between pots for rain and excess water drainage
- place pots in straight rows in blocks/ beds

Improper placing will result in:

- deformity of pots
- insufficient space for drainage
- distortion of root growth
- distorted growth of the nursery stock

Self-Check	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write the ratio of soil mixture for good nursery input? (5)
2. Write Properties of a growing medium or soil mix? (5)

Note: Satisfactory rating - 18points

Unsatisfactory - below 18 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

2.3. Arranging polythene tubes on beds

The filled tubes can conveniently be stacked and carried to pot beds in robust planting trays. The tubes must remain in a vertical position all the time, in contrast to the compacted soil tubes which are stacked horizontally for convenience of nursery workers. (The best methods for producing vigorous healthy seedlings must take precedence over the convenience of the labor force when it comes to how things are done in the nursery.) Pots should be placed into pot beds exactly vertically to prevent roots growing unevenly within the pot. Pots should be packed tightly, but without deformation. This will leave spaces for drainage of any excess water between pots.

- Proper placing of pot
- Pots are placed in upright position
- Pots space is to be left for rain and excessive water drained off easily
- Placed in a straight row
- Improper placing of pot
- Deformity of pots
- Insufficient space for drainage
- Disordering of root development

Self-Check	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write how to arranging polythene tubes on beds? (10)

Note: Satisfactory rating - 5points

Unsatisfactory - below 5

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

2.4. Identifying Limitations and seeking assistance

2.4.1. Controlling pests and diseases in the nursery

You're working hard to grow your seedlings and plant them out. The last thing you want is to lose them to pesky pests and dastardly diseases. The best way to control pests and disease is to prevent attack. If your seedlings have already been attacked, don't despair—find out what pest is damaging them and get rid of it. Animal pests A big risk is from farm and domestic animals, but a good fence will keep them out. (And consider growing a living fence—smart in the long run.) Smaller creatures like insects. Nematodes and rodents are harder to deal with.

Insects that can cause damage in tree nurseries include grasshoppers and crickets (both eat young seedlings); caterpillars (especially cutworm, which cuts seedlings just above the soil while feeding); scale insects and mealy bugs, which weaken seedlings by sucking the sap; termites, which damage pots and disrupt the soil in them; and ants, which attract scales and mealy bugs, and harvester ants may carry away seeds. Some insects attack only specific tree species, like sesbania beetles, cypress aphids and eucaena psyllids. Nematodes are tiny worms that attack roots and cause swellings. Severe infection can stunt or even kill seedlings, cause chlorates (discoloration of the leaves) and wilting.

• How to control insects

First, avoid conditions that attract insects.

- Keep the area around your seedbed clear of other vegetation that offers the insect pests food and shelter. A plant nursery protected by chili plants to keep insect pests away.

Grasshoppers are among the most destructive insect pests.

- Grow insect-repelling plants like pyrethrum, garlic, chilies and marigolds around the beds.

Next, try to get rid of the insects without resorting to pesticides.

- Destroy the nests and queens of termites and ants.

- Pick insects off seedlings when you see them.

- If you find seedlings whose stems have been cut, look for grey or brown

Cutworms 1–2 cm long, in the soil beneath. Pick them out by hand and destroy them.

- Spray seedlings infected with scale insects and mealy bugs with water in

which you have steeped tobacco or garlic, or with a soap and water mix.

- Many natural predators in the nursery help control pests. Spiders, lizards, snakes and frogs are among the many natural helpers that can control pest problems. Before killing any animal, first consider what it eats! If you have to use an insecticide, DO NOT handles it yourself. Read the box carefully for instructions.

❖ Other animals

Rats and mice can get through fencing and eat seeds or young seedlings. Place your seedbeds and pots away from stone walls and rubbish heaps, and keep the area around them clean. Don't leave food scraps lying around. Cats can control the rodent population. If you can afford it, build a frame over your seedbed and pots and cover it with mesh. If you need to poison rodents, have an adult handle the poison. Place bait where only rodents can reach it. Birds that don't damage seedlings but eat insects that attack them are useful. But other types of birds may eat the seeds or seedlings. Suspended lids from old tin cans clang and twirl in the breeze to scare birds away from a plant nursery. Strips from used plastic bags can also work.

❖ Diseases

Seeds infected by pathogens that cause disease—tiny organisms such as bacteria, viruses and fungi produce fewer seedlings. Infected seedlings may not reach the planting-out stage.

- **Fungi.** Even in dry climates, nurseries provide the warm, moist conditions that fungi like. Symptoms of fungal disease include choleras and stunted growth.

- Common fungal diseases:

- Damping-off, which affects germinating seeds and young seedlings in the first 2–3 weeks after germination. One type kills the seedling before it has emerged from the soil or the seed. Another type causes the stem of the young seedling to rot just above soil level.

Primary school children in Tanzania inspect their seedlings for signs of disease.

- Root and stem rot. Many fungi attack the fine roots of young seedlings.

Damping-off can lead to root rot. Once the rot spreads to the stem, the seedling dies.

- Shoot diseases. Wet conditions encourage spores to germinate and enter the seedlings. Leaf spot disease causes seedlings to shed leaves. Powdery mildew covers the leaves in powdery, white spores and weakens the plant.

➤ To avoid and control fungus

- Do not overwater.
 - Space seedlings well—crowded seedlings increase dampness and warmth.
 - Give the seedlings no more than 50% shade.
 - Use light, well-drained soil mix.
 - Be careful when transplanting young seedlings. If the stem is even slightly damaged it is more likely to get infected.
 - Remove and burn any diseased seedlings.
 - Use fungicides only if necessary World Agro forestry Centre
- Bacteria can cause vascular wilt disease in seedlings and soft rot in stems.
Viruses often infect fruit trees, causing choleras and deformity.
Wound pathogens can infect seedlings in patches where there is a wound.
Prune just below the infected patch.

➤ Controlling diseases

Here are 3 basic steps:

1. Keep your nursery free of pathogens Prepare clean seeds from reliable sources.
2. Avoid conditions that encourage disease to develop if pathogens are present.
3. Use chemical pesticides.

Sometimes plants may appear infected with a disease when they are in poor health for other reasons:

- Long, thin stems and pale leaves (retaliation)—too much shade
- Discoloration of leaves (choleras) and leaf deformity—nutrient deficiency or waterlogged soil
- Twisted or deformed shoots— nutrient deficiency or careless herbicide spraying
- Sunscald (grey blotches)—sudden strong sunshine when shade is removed too quickly
- Frost damage—sudden cold weather even if above freezing; plants may recover when temperature rises. Be careful not to overwater your seedlings because this can cause fungal disease.

❖ Tree Is Life

Not all insects are pests! The ladybird is known as the ‘farmer’s friend’ because it eats the tiny aphids that feed on and destroy young plants.

❖ Use chemicals safely

Herbicides, fungicides, insecticides and other chemical pesticides are poisonous! Use chemical controls only when all else fails. Children must not handle them, only adults—and make sure

they take these precautions: Before using the pesticide, read the manufacturer's instructions and follow them exactly.

Store pesticides in airtight containers and label them clearly. Lock them away out of children's reach.

Always use the correct pesticide for the insect pest or soil type. Wear gloves, clothing that covers arms and legs, and a mask when spraying. Do not reuse pesticide containers and tools for anything else. Puncture empty containers and dispose of them by burning or burying. Spray topical pesticides and herbicides directly on the plant. Spray systemic pesticides on the soil, so that the plant absorbs them.

❖ Fact file

Some natural remedies

- Soft-bodied insects (aphids, mites) Mix 1 tablespoon cooking oil with half a tablespoon of chopped soap in 1 liter of water. Mix well and spray onto the tops and undersides of leaves.
- Fungal diseases. Mix 2 tablespoons bicarbonate of soda (baking soda) with 1 liter of water and spray on infected areas every few days until the fungus clears up.
- Powdery mildew. Mix equal parts milk and water and spray on infected plants once a week for 3 weeks.
- Cabbage moths. Cut opened milk cartons into 5-cm squares. Cut from 1 side into the centre. Make other slit crossways in the centre. Open the slit and slide the card either side of a seedling stem. The plant will push it open as it grows. The card will prevent cabbage moths from laying their eggs at the base of the seedling stem.

❖ Controlling weeds in the nursery

- ❖ Weeds take nutrients, water and light from tree seedlings. If they are not controlled, they can sap the seedlings so much that they die. Nurseries have enough water and light for both seedlings and small weeds, but large weeds will take too much. Remove weeds as soon as you spot them. Prevent weeds.

❖ Weed control is to prevent them from arriving.

The most likely source of weeds is the manure or topsoil used in the potting mix. Topsoil from a weedy location will contain weed seeds. So will manure that is not well decomposed. (Cattle manure can be a major source of weeds.) Make sure that any manure you use in your potting mix has been properly composted. The grasses you use to make shade may contain weed seeds. Remove weeds and seeds from shading materials before you take them to the nursery. Weed seeds can come in the wind or in irrigation water. Windbreaks can prevent wind-borne seeds from blowing into the nursery. Well water is likely to be free of weed seeds. If you don't have a well, check the water for seeds. If weeds grow from the soil underneath the pots, place the pots on a sheet of strong plastic. Weed the whole nursery area to prevent weeds from spreading to pots and seedbeds. Your nursery will look trim, too!

If weeds are a problem that happens season after season, take samples of each ingredient in the potting mix. Water them to germinate any weed seeds. The sample that sprouts weeds is the culprit! Either change the source of that ingredient or for several weeks before you sow, water pots and seedbeds to sprout any weeds. If any appear, kill them. You can stop watering them, remove them by hand or spray them with herbicide. Use a pointed stick or piece of wire to help dig out the roots. World Agro forestry Centre Get rid of weeds whatever you do, some weeds will appear.

What then? Weed the whole nursery regularly. Weed around young seedlings every 2 weeks.

As the seedlings grow, fewer weeds will compete and you won't need to weed as often.

Weeding time is also a good time to thin young potted seedlings so that you have just 1 healthy seedling per pot.

Removing weeds when they are small is easy and saves precious nutrients for the seedlings.

Large roots of big weeds are hard to remove completely and without disturbing seedling roots. Moisten the potting mix, and then pull the weeds out gently to avoid breaking them off. Use a pointed stick or piece of wire to help dig out the roots. Burn or bury weeds—don't add them to the compost heap. Dodder is a parasitic weed that covers seedling leaves and stems with thin threads. Burn or bury dodder-infested seedlings before the dodder flowers and produces its tiny seeds that spread easily.

Big weeds have large roots that are hard to remove without damaging the seedling.

CAUTION! Read page 27 before using chemical controls.

❖ 2nd Chemical treatment

If you can't control the weeds with weeding, you will have to use a herbicide. Spray seedbeds or pots when they are empty. Spot spray individual weeds. Herbicides are useful because ...

Herbicides help control weeds with rhizomes or underground stems that are difficult to dig up and remove.

Spraying weeds reduces the manual labor used in weeding. However, be warned that ...

Herbicides are expensive. Herbicides are dangerous for your health if not used properly. Read the container for guidance on using herbicides safely. Herbicides can be difficult to apply.

Spray can drift onto seedlings and damage them.

Self-Check	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write How to control insects? (5)
2. Write method of controlling weeds in the nursery? (5)

Note: Satisfactory rating - 5points

Unsatisfactory - below 5 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____
2. _____

Seed beds are of two types: *raised* and *sunken*.

The importance of seed beds

- ❖ To germinate seeds
- ❖ To maintain the germinated seedlings for a varying period of time

Requirements of good seed beds

- ❖ Preferably well-drained virgin soil
- ❖ Soil should be of average fertility, deep, fine sandy-loam
- ❖ The soils should be free from stone and contain a fair amount of organic matter
- ❖ Good initial moisture supply
- ❖ Good aeration

Preparation of seed beds

- Dig the soil to an appropriate depth
- Remove all stumps, boulders, pebbles, and grass roots
- Pulverize the soil
- Dry leaves can be burnt on the beds to kill harmful insects
- Rake and level the soil and mix with appropriate soil amendments (P^H values of soil can be corrected by adding charcoal dust and ashes)
- Prepare the bed of suitable specification (usually 1m x10m; however length could be varied) with longest side facing ***East-West direction***
- Add sand , if the soil is heavy until good tilt is obtained
- Incorporate organic manure to the top 1 or 2 cm
- Leave a gap of 1m between two beds as walking path
- Number the beds serially to maintain the record of planting stock



The choice between sunken and raised beds determined by:

- Water availability

- Characteristics of the soil
- The type of the plant to be cultivated

☞ Raised seed beds are prepared in wet area to provide good drainage during rainy season

☞ Sunken seed beds are prepared in dry area for easy watering and better retention of moisture

First marking on the ground is done as shown in figure 7.2.1a. UN shaded area will be the bed area and shaded area will become path. The soil from shaded area is dug and heaped on un shaded area. To make the bed 25cm raised, only 12-15cm soil needs to be dug. Since dug soil will be heaped thus automatically height would become double (Figure 7.2.1b) whereas, for preparing sunken bed just the reverse is done. The soil from un shaded area (Figure 7.2.2a) is dug and put on the shaded area. Care is taken that drainage in shaded area is good after removing the soil, which will also acts path (Figure 7.2.2b).

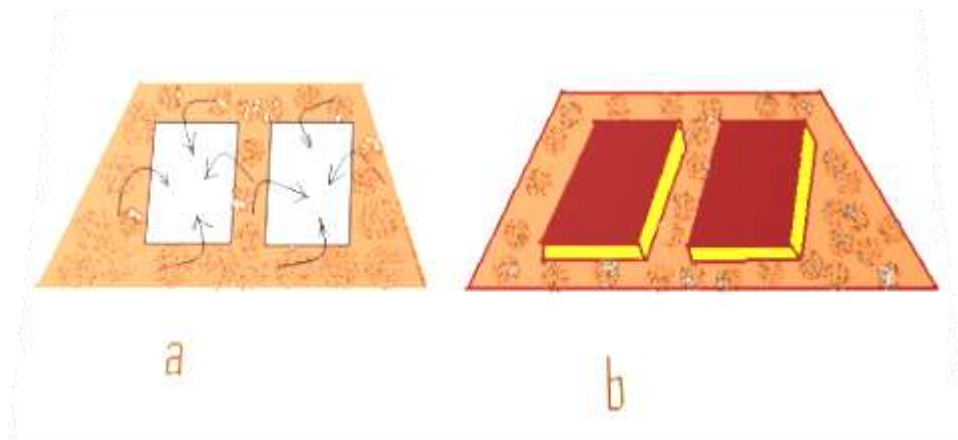
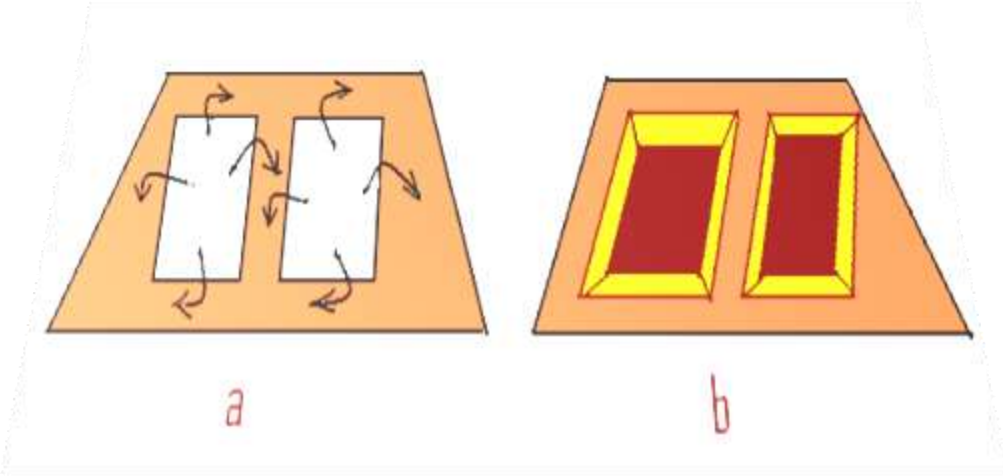


Figure 7. 2. 1: Method of preparing raised bed



Self-Check	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write the requirements of good seed beds (5)
2. Write types Seed beds (5)
3. What is the importance of seed beds? (5)

Note: Satisfactory rating - 18points

Unsatisfactory - below 18 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____
2. _____

Operation sheet- 1

Filling pots for production of containerized seedlings

❖ Objectives:

To fill Pot is help growing of seedlings in containers as standard method in most tree nursery projects.

➤ Materials required

- Humus-rich soil
- Ordinary agricultural soil
- Sand
- Polyethylene bag
- Funnel/ scoop
- Pot cutting roll
- Sieve
- Water
- Overall
- Safety shoes
- Sharp knife
- First aid kit
- Watering can
- Spade/ shovel

➤ Procedures

- ✓ sieve the soil mixture through 2mm mesh to remove clods/stones
- ✓ mix the ingredients and turn with shovel
- ✓ keep the soil mix moist while filling
- ✓ Fill the bag and firmly compact the lower third of container. You can use scoop/ funnel to fill the bag
- ✓ avoid air pockets in containers during the bag fill
- ✓ place pots in an upright position
- ✓ place pots in straight rows in blocks/ beds in an upright position

LAP Test	Practical Demonstration
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Name: _____ Date: _____

Time started: _____ Time finished:

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within --- hour.

Task 1. Pot filling

Task 2. Soil mixing by ratio

Operation sheet -2

➤ Seed bed preparation

❖ Materials required

- Meters
- Ranging poles
- Water level
- Safety shoes
- Overall
- Compass
- Clinometers
- Riveting board
- Gravel
- Sand
- Soil
- Procedures
 - Dig the soil to an appropriate depth
 - Remove all stumps, boulders, pebbles, and grass roots and pulverize the soil
 - Mark out the size and shape of the bed with peg and cord
 - Erect riveting board 15 cm X 3-4 cm in size around the mark area
 - Place a layer of gravel not more than 3 cm in diameter, sand sieving to a depth of 5 cm in the bed and smooth the layer and press it slightly with a flat board
 - If gravel of 3 to 5 cm in diameter is used for more efficient drainage, add a 2-5 cm thick layer of unsieved forest soil on top of the gravel layer.
 - Fill the remaining volume of the bed to the top; 5-10cm mixture sand + soil of 1:1 and Use a flat board to level the soil with the top of a riveting board
 - Firm the soil in bed with hands working in to all sides and corners to ensure that there are not unfilled spaces in the bed.
 - The surface of the bed can be protected with a thick layer of green grass and leaves
 - Leave a gap of 60cm between two beds as walking path
 - Number the beds serially to maintain the record of planting stock

LAP Test	Practical Demonstration
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Name: _____ Date: _____

Time started: _____ Time finished:

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within --- hour.

Task 1. Dig the soil to an appropriate depth

Task 2. Make bed

Task 3. label bed as standard