

**NATURAL RESOURCES
CONSERVATION AND DEVELOPMENT
LEVEL II**

Learning Guide -18

Unit of Competence: Assist Nursery Work

Module Title: Assisting Nursery Work

LG Code: AGRNRC2 M05 0919 LO1-LG-18

TTLM Code: AGRNRC2 TTLM 0919v1

LO 01: Plan nursery work

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

- Determining and Developing site Preparation plan
- Identifying Potential and existing risk and hazards
- Conducting consultation
- Documenting site plan
- Identifying and Organizing nursery inputs
- Identifying and preparing check list and information sources

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

- Prepare parent plant and suitable method applied to take the cutting which is appropriate to the species
- clear Work area and clean to eliminate contamination in accordance with hygiene practices and organizational requirements
- assess visually Cuttings and select for propagation in accordance with work order requirements
- identify and provide Correct conditioning and storage procedures appropriate to species requirements for maximum viability of cuttings
- determine and apply method of cutting preparation without causing damage to parent plant and the cuttings

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 4.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3, Sheet 4, Sheet 5 and Sheet 6”.
4. Accomplish the “Self-check 1, Self-check 2, Self-check 3, Self-check 4, Self-check 5 and Self-check 6” in page -6, 9, 12 and 14 respectively.

Introduction

When the tree or shrub seedlings arrive from the nursery, the site should have been prepared to ensure that planting can proceed without delay.

Objectives of site preparation

Among the objectives of site preparation are to:

- Remove competing vegetation from the site.
- Create conditions that will enable the soil to catch and absorb as much rainfall as possible. Surface runoff should be reduced to increase the moisture in the soil.
- Provide good rooting conditions for the planting, including a sufficient volume of root able soil. Hardpans must be eliminated.
- Create conditions where danger from fire and pests is minimized.

Site preparation is directed toward giving the seedlings a good start with rapid early growth. In general, the methods used to achieve site preparation will vary with the type of vegetation, amount and distribution of rainfall, presence or absence of impermeable layers in the soil, the need for protection from desiccating winds, and scale of the planting operations. Additionally, the value of the tree or shrub crop to be grown is important in determining the amount of expense that may be justified in plantation establishment.

Methods of site preparation: In general, land or site preparation can be manual or mechanical.

- **Manual Preparation** is cultivate the soil and open up a good sized slot in the soil with the blade of the spade. This allows the seedling roots to spread more naturally. A narrower V-shaped slit will sweep up roots as the seedling goes in, leading to lop- sided root development and risk of toppling of

the seedling by wind.

- Place the seedling in the opened slot. Replace the soil around the roots.
- The seedling is pulled upwards, about 50–100 mm, to straighten any roots that may be twisted or swept up. Using the sole of the boot, not the heel, the soil is firmed around the seedling. Planters use the same technique for each seedling to ensure uniformity throughout a stand. Experienced contractors will plant between 800 to 1,500 trees per day.

❖ **Mechanical preparation**

several types of mechanical tree planters are in use: example; Continuous furrow planters. Preparation of the site by hand is possible and economical only for relatively small-scale projects, where the labor of clearing the competing vegetation and working the soil is not too time-consuming. Under certain conditions, animal-drawn ploughs and harrows can also be economical for small-scale operations. Mechanical soil preparation, used increasingly in large-scale planting programs, has become a common practice in many areas; often, this is because the supply of labor and the time available for ground preparation are too limited to permit large-scale projects to be undertaken by hand. Some operations, such as deep sub soiling and the breaking up of hardpans can only were done by machines.

Whatever method of site preparation is used, a planting pit (of an appropriate size) should be prepared. The objective of creating planting pits is **to aerate and loosen the soil** in which the plants will grow. When these planting pits are prepared, they should not be left empty with the excavated soil lying on the ground, but refilled immediately; otherwise sun and wind will dry out the soil completely. Soil preparation can be carried out in patches, strips, or by complete cultivation. Complete cultivation is necessary for tree and shrub species which are intolerant of competition from grass, forte, and woody growth (such as most eucalyptus species). Hand planting methods fall into two general groups- whole and slit methods. Whole planting can be done with a mattock, hoe or shovel. It is particularly adapted to rough, rocky land, trees with large, spreading root systems, finer textured (clay) soils and for inter planting in previously planted areas. Slit planting is much faster than hole planting and is especially adapted for tap-rooted species and use on coarse (sandy) and medium textured loam and silt loam soils.

Hand planting rates generally vary from 200 to 500 trees per man day, although faster rates may be possible under optimum conditions. See Fig. below **planting methods**. So, too deep and roots bent; incorrect: too shallow and roots exposed.

Dibble planting. Clockwise from upper left, 1) insert the dibble as shown and pull toward planter; 2) remove dibble and place seedling at correct depth, 3) insert dibble 2 inches toward planter from seedling; 4) pull handle of dibble toward planter, firming soil at bottom of roots; 5) push handle of dibble forward from planter, firming soil at top of roots and 6) firm soil around seedling with feet. **Mattock planting** Clockwise from upper left, 1) insert mattock-lift handle and pull; 2) place seedling along straight side at correct depth, 3) fill in and pack soil to bottom of roots; 4) finish filling in soil and firm with heel and 5) firm around seedling with feet

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 methods of site preparation (6)**
2. **What is manual site preparation? (3)**
3. **What is mechanical site preparation? (3)**

Note: Satisfactory rating - 18points

Unsatisfactory - below 18 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____
2. _____

Information Sheet-2	Identifying Potential and existing risk and hazards
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❖ Hazard can be defined:

A hazard is anything that has the potential to harm the health or safety of a person and in the case of dangerous goods, includes damage to property.

OHS hazard in tree nursery work place include heavy materials and equipment, slippery or uneven surfaces, moving machinery and vehicles, solar radiation, and potential dangers from handling potting media, fertilizers, watering systems, and spider and insect bites.

The workplace needs to be free from these hazards, therefore all persons on a daily basis when walking and working around the property, need to be on the lookout for potential hazards and report it.

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 OHS hazards in tree nursery work place (6)**
2. **What is hazard? (3)**

Note: Satisfactory rating - 18points

Unsatisfactory - below 18 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1 _____

2 _____

Introduction

Consultation of nursery site

The major categories of biological agents which might damage seedlings in nurseries are the following:

- Insects
- Pathogens(these are microscopic organisms that include fungi, bacteria, viruses and nematodes)
- Animals (these include mice, rats and squirrels)

Inspecting pest and disease incidents: The effect of pest and disease on the seedling is not easily detected it requires continuously follow up and inspection. Because the problem might be because of other problems/deficiency of nutrients, water and etc.

❖ Nursery site Prevention

The most effective strategy against pest and disease are to prevent them from ever being introduced and established. Preventive measures typically offer the most cost-effective means to minimize or eliminate environmental and economic impacts. Prevention relies on a diverse set of tools and methods, including education. The Forest Service has a wealth of experience and skills within its own organization in addition to those available through numerous collaborators. As an agency capable of working across the landscape and with international partners, the Forest Service is in a good position to lead efforts to prevent potential invaders. Our emphasis will be to identify and protect nurseries that have not been invaded by pest and disease. Prevention includes education and outreach to raise the awareness of the pest and pathogen problem. By enlisting the skills of our science and education programs, we can achieve a successful pest and disease prevention awareness campaign on a national scale.

Establishing effective domestic and international partnerships is also critical for effective prevention programs.

❖ **Insect**

There are many insects that are potential pests in nurseries, but relatively few appear to be of economic importance to seedling production. In the majority of nurseries insects' area nuisance but they do not regularly cause major plant losses. The nursery foreman should, however, be constantly vigilant to detect any pest/disease problem at an early stage so that preparations can be made for control if this should become necessary. There are several insects which may at times become a significant problem in some nurseries and these are considered below.

- ❖ Grasshoppers and crickets
- ❖ Termites and ants
- ❖ Scale insects and mealy bugs
- ❖ Cutworm and other caterpillars

➤ **How to Control of Birds, Rodents and pests**

Birds and mice: in some areas, birds can eat germinating seeds (especially of pines) during the day and mice during the night. Birds can be kept at a distance by spreading thorny branches onto the seedbeds. The problem is that the tiny seedlings may be damaged when branches are re-moved. A better way of controlling both birds and mice is to construct frames with close mesh wire (less than 6-mm mesh) and set these protect the seedbed.

The soil can be sprayed with tobacco water. Poor quality dried tobacco leaves are soaked into water to make a kind of dirty colored solution.

The third alternative is applying a mix of gamoxone powder with the upper layer of the seedbed soil before sowing.

❖ **Disease**

Fungi, bacteria, or viruses may cause disease. However,

Most of disease in a nursery is produced by **fungi**, where as bacteria and viruses normally do not create problems.

❖ **Damping off disease.**

Damping-off is a disease of young seedlings caused by a number of soil born fungi (such as *fusarium*, *pythium*, *Rhizoctonia*etc) altogether there are about 30 species of fungi.

Damping off can be divided into two.

- **Control:** Damping-off is favored high humidity, damp soil surface and heavy clay soils, cloud weather, too heavy shade, dense stands of seedlings which reduce evaporation, high content of organic matter, high levels of nitrogen, alkaline soils (pH 6 or above). Warm weather encourages its spread. The risk of damping-off is especially high when sowing done during rains. Damping-off can be controlled by paying due attention to proper cultural practices and by using certain chemicals.
- **Cultural practices:** The most effective **preventive measures** are avoiding of excessive watering and maintain of good aeration in seedbeds. Correct density of sowing is important as aeration in dense patches of seedlings is much reduced. Too heavy shading must be avoided. During long periods of Cloudy weather, it is advisable to remove the shades entirely.

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 types of damping off (6)**

2. **How to control birds and mice? (3)**

Note: Satisfactory rating - 18points

Unsatisfactory - below 18 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1 _____

2 _____

Information Sheet-4	Documenting site plan
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1.4. Documenting site plan

- ✓ Shape: The nursery should, if possible, be square shaped to minimize boundary lines which have to be fenced, and to avoid unnecessary transport. If the terrain does not permit this, it should be of rectangular shape.
- ✓ Size: When determining the required size, the area needed for production (pot beds, seedbeds and reserve beds) and for roads, paths, buildings, fences, windbreaks, etc. has to be taken into account. Source: ILO 1989 Supporting Nursery Work 2011

For the following example, we assume that 85,000 seedlings are required per annum, including replacement of last year's failures.

Because not all plants raised will survive to seedling stage and a certain number will not be of good enough quality to be delivered for planting, more plants have to be produced than will be planted.

This reserve should be about 10-15 per cent of the requirements.

For 85,000 seedlings, this is, say, 11,000.

We assume that pots of 20 x 12.5 cm flat are used. When filled, their diameter is about 8 cm. One square meter of pot bed can hold 156 pots of this size. 96,000 pots require 615m² of pot beds

The seedbed area can be estimated as 20 per cent of the pot bed area. For our example this would be: $625 \times 0.2 = 125$ m. An additional 20 per cent of the bed area is set aside as a reserve area to produce a larger number of plants or seedlings in larger containers (e.g. for difficult sites or fruit tree seedlings for grafting). This brings the total bed area to 900 m.

Preferably, all seedbeds and pot beds should be of the same size and shape. The roads should be wide enough to permit passage of pick-up cars and light trucks, i.e. 3-5 m, preferably 4 m. Indications for the dimensions of buildings and other facilities are given in the table opposite

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. Describe the layout of nursery site (6)
2. What is hazard? (3)

Note: Satisfactory rating - 18points

Unsatisfactory - below 18 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1 _____

2 _____

- ❖ **Nursery inputs: Soil** components and planting material (seeds) are the most common types of nursery inputs to raise seedlings in a nursery site.

A. Nursery soil mixture

For the production of bare-root seedlings native (available) soil is used. Usually, additives such as **sand** and **organic matter** are added to it.

For raising seedlings using pots, soil ingredients used for filling of pots are brought from outside the nursery. Each nursery should find out the best possible potting soil using materials within reasonable distance from the nursery.

The qualities, which make up good nursery soil, are Good drainage

- ✓ Satisfactory contents of essential nutrients.
- ✓ Good organic matter content to retain moisture.
- ✓ Sufficient adhesion to form a soil cylinder (the soil stays in the pot without falling through the bottom)
- ✓ Correct acidity

Not many soils have all these qualities; humus rich forest topsoil has more of these desirable characteristics than other soils. This kind of best local soil, which is easily available in large amount, is called basic soil. It forms the basis for the potting mixture. Basic soil needs to be forest soil, humus rich grassland soil, or broken soil or agricultural soil.

Adding some of the following can modify the basic soil

- **Gravel or sand:** These improve drainage and give good root penetration.
- **Manure or compost:** this provides organic matter to improve moisture-holding capacity. It also provides nutrients.

- **Clay:** Helps the soil bound round the roots and form soil cylinder (improve adhesion). It also improves moisture and nutrient holding capacities to some extent.
- **Fertilizers:** these provide essential nutrients.
- **Chemicals to lower pH:** Optimum pH for growth of most tree seedlings is below 6 and between 4.8 and 5.2 for pines
- **Soil from pine plantation:** This is needed for soil mixture for all pine species.

The proportion of the different ingredient including the basic soil depends on the quality of the basic soil and on the availability of the ingredients. Every nursery manager should carry out experiments or observation to develop the best possible combination

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 nursery input material? (5)
2. Write the qualities of good nursery soil? (5)

Note: Satisfactory rating - 5points

Unsatisfactory - below 5 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1 _____

2 _____

Information Sheet-6	Identifying and preparing check list and information sources
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How we get and use information

How much information we retain in the communication process depends on many factors. It is important for each of us to recognize how we learn best. Do we remember most of what we read? Most of what we hear? Do we learn more if someone shows us?

Typically, we retain information at these rates:

10 percent of what we read

20 percent of what we hear

30 percent of what we see

50 percent of what we see and hear

70 percent of what we see and discuss

- ***Nonverbal messages:*** unspoken and more difficult to interpret than verbal messages, but are just as important. This is particularly true when you think that someone is saying one thing and showing body language that tells a different story.
- ***Writing:*** a type of unspoken communication. Communication in writing is powerful and lasting. Whether you write a letter, a memo, or an email message, written communication can be recalled word for word.
- ***Spoken:*** which is often misquoted and misremembered.
- ***Writing lasts a long time. So, think carefully about written communication.***

Work place communication

Effective communication in the workplace happens with effort. That effort must include participation and agreement between supervisors and employees. Each must want similar goals. Each must work with the other to achieve the goals.

A sense of common purpose can be the key in getting along with your coworkers. If you do not understand your department's or organization's goals and objectives, ask your

Boss. If you and your coworkers focus on common purpose, tasks become easier and results more predictable.

Terminologies

Bare root seedlings: Seedlings

Manufacturers and suppliers are responsible for making material safety data sheets (MSDS) available for all agricultural chemicals and hazardous substances. MSDS contain specific details and information about the hazards of substances and how to use and store them safely, including use of appropriate PPE, first aid and medical treatment. It also helps you to identify, assess and control risks associated with the use of the substance on your farm. MSDS must be made readily accessible and available to all users handling the chemicals.

E. First Aid Kit

Employers should supply and maintain appropriately stocked first aid kits that are strategically located. As tractors, trucks and utilities are classified as a workplace and used in isolation; a first aid kit should be fitted, according to the relevant risk. A list of emergency services, telephone numbers together with basic first aid notes should also be included.

All workers should be aware of the location of first aid kits and appropriate signs should indicate their locations. It is recommended that all workers have first aid skills. There is legislative requirements detailing what contents are to be kept in each kit, this may vary depending on your location and number of employees.

- ***Emergency Procedures***

In the event of an emergency, the property should have documentation readily available to employees and emergency services to respond appropriately in the event of an emergency. This information should be displayed or kept on the premises in a place that is easily accessible to the emergency services (for example in the office, workshop or located at the main entrance of the property).

The documentation should be housed in an unlocked holder of substantial weatherproof construction and marked 'Emergency information box'. Contents to be available in the 'Emergency information box' should include, but are not limited to:

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. What is information? (5)
2. Write tools of communication?

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____
2. _____

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