

**Natural Resources Conservation
and Development
Level-II**

Learning Guide-10

**Unit of Competence: Assist in Planting Material
Collection and Processing**

**Module Title: Assisting in Planting Material
Collection and Processing**

LG Code: AGR NRC2 M04 LO-1 LG-10

TTLM Code: AGR NRC2 M04 TTLM 0919v1

LO1: Identify mother trees

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

- Identifying and assessing provenances for safe working conditions
- Selecting and checking appropriate equipments to work requirements for operational effectiveness in accordance with manufacturer's recommendations
- Planning site selection activities in accordance with site procedures
- Establishing and maintaining communication with others in accordance with OHS requirements
- Assessing and using environmental conditions to plan the identification of mother trees based on the development of each tree stand
- Identifying and assessing type and quality of mother trees for safe working conditions
- Assessing genetic variation and seed sources to collect quality seeds

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:**

- Identify and assess provenances for safe working conditions
- Select and check appropriate equipments to work requirements for operational effectiveness in accordance with manufacturer's recommendations
- Plan site selection activities in accordance with site procedures
- Establish and maintain communication with others in accordance with OHS requirements
- Assess and using environmental conditions to plan the identification of mother trees based on the development of each tree stand
- Identify and assess type and quality of mother trees for safe working conditions
- Assess genetic variation and seed sources to collect quality seeds

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, Sheet 4, Sheet 5, Sheet 6, Sheet 7 and Sheet 8".
4. Accomplish the "Self-check 1, Self-check 2, Self-check 3, Self-check 4, Self-check 5, Self-check 6, Self-check 7 and Self-check 8" in page -6, 8, 11, 14, 16, 18, 21, and 24 respectively.

1.1. Concepts of Occupational health and safety (OHS)

OHS is a cross disciplinary area concerned with protecting the safety, health and welfare of worker and workplace. It provides a means for workers to take a proactive role in addressing work place safety and health.

Safety: - can be defined as a freedom from danger: protection from, or not being exposed to, risk of harm or injury.

Safety in work place: effort to prevent work place accidents and injuries. Which includes:-

- efficiently and safely carry out seed collecting procedures
- Use of personal protective device and clothing
- Proper wearing of overall dressing (boot, "tuta", helmet, eye glass, safety belt, mask, gloves)
- Preparing and knowing appropriate application of first aid materials.
- All tools should be hung or otherwise in fixed or safe place in the nursery store where can be readily available.
- Safe work procedures (including required actions relating to fire, manual handling including shifting, lifting and carrying)
- Working ethics
- Safe working environment (environmentally sound, socially acceptable and economically viable)
- Organizing working tools and equipment
- Well knowing of all tools and equipment manual
- Understand the appropriate use and handling of tools and equipment in processing and collecting seeds (ergonomics)
- All safety precaution must be observed in tools and equipments used for processing and collecting seeds.
- Firefighting equipment

- hazard and risk control
- elimination of hazardous materials and substances
- handling of chemicals used in the treatment

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. Define OHS.(3points)
2. List out the efforts to prevent work place accidents and injuries.(5 points)

Note: Satisfactory rating - 8 points

Unsatisfactory – below 8 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

2.1 Concept of communication

Communication has been variously defined as the passing of information, the exchange of ideas, or the process of establishing a commonness or oneness of thought between a sender and receiver. This definition suggests that for communication to occur there must be some common thinking between two parties and information must be passed from one person to another (or from one group to another).

This may include technical report writing, use of telephone, notice board, personal communication and using other communication facilities, which may:

- Use appropriate communication and interpersonal techniques with colleagues and others.
- Communicate ideas and information in simple language to confirm work requirements, convey information and requests to colleagues and report and record outcomes of seed collection, treatment and storage.
- Include verbal and non-verbal language, constructive feedback, active listening, questioning to clarify, confirm understanding, use of positive, confident and cooperative language,
- Use of language and concepts appropriate to individual social and cultural differences, control of tone of voice and body language.

The communication process is often very complex. Success depends on such factors as the nature of the message, the audiences' interpretation of the source and the medium used to transmit the message may also affect the ability to communicate, as do many other factors. Words, pictures, sound, and color may have different meanings to different audiences, and people's perceptions and interactions of them vary.

Self-Check -2

Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List out the purposes of communication with others in work place.(5 points)

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

3.1 Concepts of Provenance

Choosing the right sp. is not the end for achieving plantation goals. The seed tree should grow in an environment, which is similar as nearly as possible to that of the area in which seedlings are to be planted. Therefore, the right provenance is equally important. However, there is usually confusion regarding the use of the terms 'provenance' and 'origin'. OECD (1994) defines the term provenance simply as 'the place in which any stand of tree is growing' or 'The locality in which there is a population of trees of a given sp. possessing distinct genetic characteristics and evolved under the local environment, site or origin of seed from trees with such characteristics is known as the provenance'. When dealing with seeds, this means the geographic location and environment where the immediate mother trees are growing (FAO, 1985). This must be distinguished from the '**origin**' which is the place where the original progenitors grew in natural forest stands (Burley & Wood, 1976)

Burner (1957 b) describes the provenance as:

- Being composed of community of potentially interbreeding trees of similar genetic constitution, and of a genetic constitution that is significantly different from other provenance.
- Being large enough for the collection of reproductive material in sufficiently large quantities for forest practice
- Being defined by boundaries that can be identified in the field.

Different genetic constitutions between provenances are the results of interaction between provenance and environment. In simple terms, overtime, the environment influenced by climate, geology and geography (and sometimes human), forms the present composition of genotype of a provenance by eliminating non-adaptable individuals and leaving those that are fit.

There is also a similar concept- Seed zone/ region of provenance. Many tropical countries have many indigenous species; but a few information on provenance trial. In that case a system of seed zones serves as a rational sampling for provenance trials (by National Forestry seed centers), for transferring seeds for national planting programs, and for indicating the maximum geographic limits within which seeds may be mixed. Seed zoning can be species related or ecological. The latter, which is feasible, is based on the assumption that there is less genetic variation within one zone that is selected from a geographical, physiological and biological point of view, than between two zones.

Seed zones are relatively large areas. It is possible to mix seeds due to uniformity of ecological conditions. However, seeds from one seed zone should not be brought in to another without conducting preliminary provenance trials to eliminate the risk of failure of the plantation and the ensuing disappointment.

As a general rule, efforts should be made to obtain seeds from trees of native stock growing as close as possible to the proposed planting area. Seeds should be collected within a distance of from 100-200 km and within 500 m in elevation of the area in which it is to be planted. Preferably, seeds used in arid zones should come from parent trees growing in the driest localities within the prescribed limits.

Self-Check -3	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

- 1. Define provenance. (3points)
- 2. What is the difference b/n provenance and origin of seed/seed zone (7points)

Note: Satisfactory rating - 10 points Unsatisfactory – below 10 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

4.1 Collection equipment

The list depends on species and mode of collection. Distance from roads and/or vehicle capacity may limit certain equipment types. The number of individual items depends on number of members of the team. It is advisable to bring spare pieces of items like hand pruners, which tend to get lost during field operations. A repair kit should include appropriate spares (bolts, blades etc.) as well as all-round repair material (strings, rivets etc).

Equipments mainly used in this topic include:

- ✓ **Seed containers** (field): Cotton bags, canvas sacks
- ✓ **Tree markers**: plastic tape
- ✓ **Climbing equipment**: Foot spurs ladders, Safety belt, safety ropes, and safety helmets.
- ✓ **Seed cutters**: cone hooks, cone rakes, pruning shears, secateurs (hand).
- ✓ **Plastic sheeting** (heavy gauge): for protection when storing fruits, extracting seed
- ✓ **Binoculars**: for studying tree crowns, fruit development, etc.
- ✓ Insecticidal and fungicidal powders for seed protection (use with care).
Axe, saw, machete, knife, Rope, string, labels, felt marking pens.
- ✓ Ladders
- ✓ Spurs (pairs)
- ✓ Rope of different types (for safety lines, tool line etc.)
- ✓ Safety harness / belt
- ✓ Extended pruners
- ✓ Hand pruners (secateurs)
- ✓ Saw pruners
- ✓ Shaking devices
- ✓ Tarpaulins

- ✓ Flexible saw
- ✓ Tree bicycle
- ✓ Shooting equipment (gun, bolt, ammunition, cleaning equipment, rifle case, ear muff)
- ✓ Repair kit (special spares, plus rivets, straps, strings, screws etc. and tools)

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Why do we check equipment and tools before going to site? (10 points)
2. What are essential materials for seed collection?(10 points)

Note: Satisfactory rating - 20 points

Unsatisfactory - below 20 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

5.1 Geographical distribution and information

5.1.1 *Logistical information*

It is important to have as much information as possible on the area of collection, such as maps (geographical, climatic, geological, road map), accommodation, service stations, medical practices, etc.

5.1.2 *Species and population distributions. Known and potential localities*

The less we know about the targeted species and populations, the more documentation is needed prior to collecting. In general, to obtain information on species distribution, it is advisable to look at floristic and ecogeographic studies, inventories, vegetation maps, surveys, soil maps, protected areas, etc. It is also useful to have information from herbarium or gene bank databases, as well from geographical information systems (GIS) or from some specific websites (e.g., <http://www.programanthos.org>)

Self-Check -5	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Why do we plan for site selection? (5 points)

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

6.1 Assessing environmental conditions

Environmental protection is a practice of protecting the environment on individual, organizational or governmental level, for the benefit of the natural environment and/or humans. Due to the pressures of population and our technology the biophysical environment is being degraded.

Protection of the environment is needed from various human activities. Waste, pollution, loss of biodiversity, introduction of invasive species, release of genetically modified organisms and toxics are some of the issues relating to environmental protection.

Environmental protection measures:

- May relate to hygiene of the area, relevant national, State and local legislation and regulations.
- May include ground growth, canopy, general forest lean, wind speed and direction, fallen trees, density of trees, ground slope, soil and water protection, ground hazards and obstacles.
- Measures may also include contingencies for modifying operations during wet or other adverse weather conditions.

Self-Check -6	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List out the environmental protection measures.(5 points)

Note: Satisfactory rating - 3 and 5 points

Unsatisfactory - below 3 and 5 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

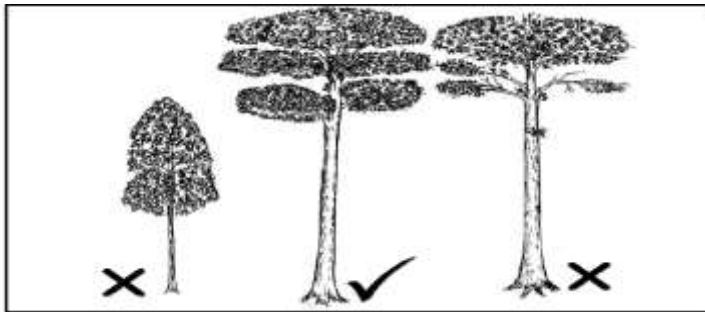
7.1 Identifying and assessing type and quality of mother trees

The appropriate selection of seed producing trees results in a high quality of seed for healthy trees. Thus, seeds shall be appropriately selected based on the following conditions:

- **Appropriate selection of mother tree**

Mother trees shall be selected in the natural forest or forest plantation, because the seeds from trees that grow alone mostly have disease, slow development and bad shape.

- We shall select mother trees with a smooth, straight shape, few branches, without any holes, and free from disease.

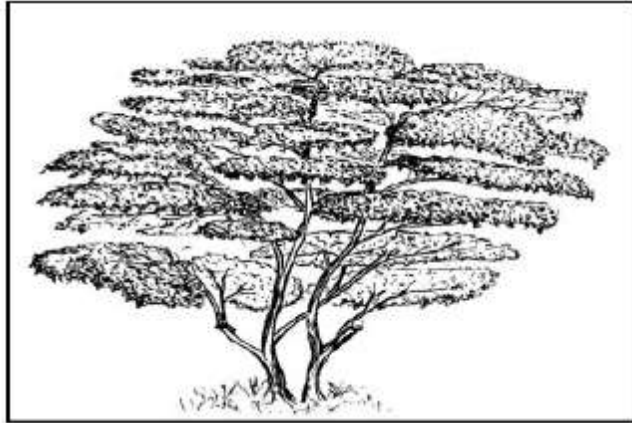


Selection of tree by purpose

We shall select mother trees according to their desired purpose:

- For construction, the mother tree will have a straight and smooth stem, with few branches
- For firewood, we shall select trees that are fast growing with bushy branches; the best types will have a high coppice potential.
- For animal fodder, we shall select trees that:
 - ✓ have leaves and fruit that can be eaten by animals
 - ✓ are fast growing
 - ✓ have many branches and leaves

- ✓ have high coppice potential



Note: Evergreen species provide more fodder than coniferous species

Self-Check -7	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What criteria should fulfill the tree to be a good mother tree for seed collection?
(5 points)

Note: Satisfactory rating - 3 and 5 points

Unsatisfactory - below 3 and 5 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

8.1 Genetic variation

Genetic variation is the number of different genotypes within a population. It determines the survival and reproductive capacities in a given environment.

- It is the result of **natural selection** (environment) and **mutation**.
- The level of variety **determines the flexibility** of a population to changing environment. Again, the greater the adaptive capacities of a population gene pool, the greater are the possibilities to colonise different ecological zones.
- There is **close connection** between genetic variation and the ability of a species or population to produce viable and fit progenies.
- Populations within a small number of individuals frequently show a high degree of **inbreeding**.
- Several researchers pointed out that crops derived **from self-fertilisation** frequently show a high rate of non-viable or hollow seeds or that decreases in yield are observed in the progenies.

However, one should bear in mind that all desirable attributes are seldom found in a single tree. So, a practical way is to select trees based on demonstrable characteristics: the phenotype as it is an expression of the interaction between the genotype and the environment.

The genetic constitution or inheritance carried by the seeds makes up the potential performance of the progeny: if the genetic potential is poor, the performance will remain poor regardless of environment and silvicultural efforts; if the genetic potential is good, this potential may be expressed by appropriate silvicultural measures. Genetic quality can only be proven by genetic tests (e.g. progeny tests) which are outside the scope of this book. Yet, in the selection of seed sources and seed trees of unknown genetic constitution a few measures and precautions can and should be taken in order to avoid genetic inferiority, viz.

1. Avoid seeds from related individuals or inbred populations
2. Avoid phenotypically inferior trees.

8.2 Seed sources

The term 'seed source' applies to the stand of trees where seed is collected. A seed source can be a number of single trees, a natural stand, a plantation, and a seed-production area or seed orchard. Seed trees are the individual trees from which the seeds are collected. Potential seed sources are identified in the planning phase; actual seed trees are often only selected during the seed collection. A seed source should yield an appropriate quantity of seed with a high physiological and genetic quality which matches the plantation site and purpose. Hence, in general the seed trees should be of good phenotype, neither juvenile nor over-mature and good seed producers (Morandini 1962). For special planting purposes, for example conservation or provenance seed stands, special consideration on sampling for the capture of genetic diversity may be included. For plantations not intended for future seed production, genetic diversity is usually of less importance, but collection should avoid inbred seed and inferior parent trees, which may affect the performance of the plantation. If, however, the plantation is envisaged to become a seed source itself sometime in the future, appropriate measures should be taken to assure reasonable genetic diversity. Information on seed source is very important for seed documentation. For each species in a seed-procurement programme a list of potential seed sources should be identified, mapped and regularly surveyed. The purpose of such listing is partly to be able to deliver seed of a particular species from a desired provenance, partly to assure that several alternative sources are available in case of crop failure in part of the population. In addition to biologically determined crop failures mentioned above, it often happens that seed sources simply disappear due to cutting.

Self-Check -8	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define genetic variation.(5 points)
2. From where may you get seed for collection?(5points)

Note: Satisfactory rating - 3 and 5 points

Unsatisfactory - below 3 and 5 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions