



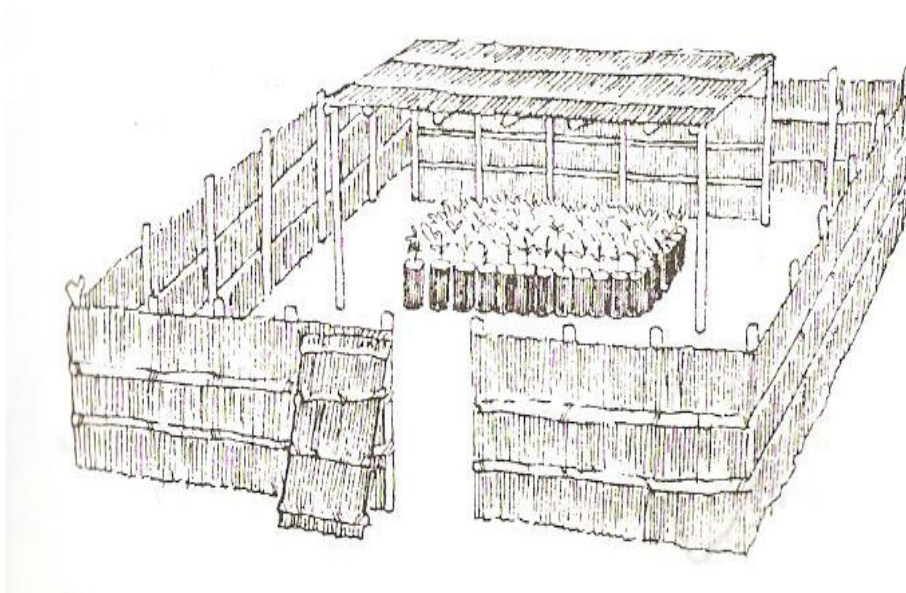
# TREE PRODUCTION

## *Trainer's guideline*

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# 1- local seed collection

## 1. Introduction

### *Which trees can the farmers grow?*

In order to have a good plan for this activity, the farmers should first think about the species that they want to grow.

- Ask farmers: **Which tree species are found here?** Write the answer on a flip chart.
- Ask farmers: **Which tree would you like to grow? For what purpose?** Write answers on a flip chart.

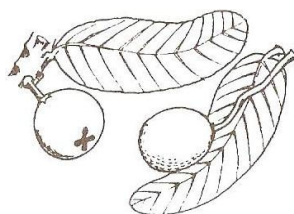
*Remark on Eucalyptus: although farmers like to grow Eucalyptus in their woodlots/homesteady due to the fact that it grows tall and straight, it uses plenty underground water leaving the soil dry. In this case, other crops around or near the plantation can not grow well.*

### *Where to source the seeds?*

- Ask the farmers: **What are the sources of tree seeds?** Facilitate the answers:
  - Forestry Offices
  - Local seed collection
- Ask the farmers: **What are the advantages of the local seed collection?**
  - It allows a farmer to have plentiful supply of seed each and every year;
  - It costs nothing;
  - As it already grows well in your area, you can be sure that it will grow best in your nursery.

### *Where to find the seeds?*

Tree seed is usually found in fruits, pods or cones of mature trees. The seed has to be removed from the fruit, pod or cone. Sometimes the seed is released from a pod or cone while it is still attached to the tree. → Show an example of each to the farmers.



*Example of fruits*



*Example of pods*

### *When to collect the seeds?*

The seeds should be collected when they are really mature. That is why seed maturing should be determined before embarking on a seed collection trip. Seed maturity can be determined using various methods. The most common is natural shedding. Although this might be a usual sign, it is sometimes not very reliable because shedding can also occur due to pest and disease. When this method is used, it is important to collect seed at the peak time of shedding. The other method is to extract and cut open a few seeds. They should be well developed and firm inside.

### *How many seeds to collect?*

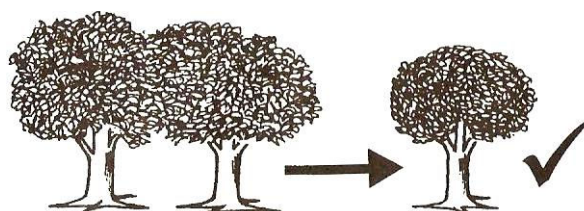
Farmers should make a plan according to the number of trees that they want to grow for each specie. To take in account the losses, they should collect an amount of seeds equivalent to 5 times the number of trees they want to grow.

## 2. Collecting seeds

This part should be done both with explanations and practices. Go around with the farmers, ask them to identify some trees they are interested in and discuss with the farmers on how to choose the good tree and how to collect the seeds on this particular tree.

### *Which trees to select*

- Collect seeds from healthy, vigorous trees of good form; select mature not old or overly-mature trees because seeds may be of low viability;
- Avoid collection from isolated trees because its likely that they are self-pollinated; seeds may be frequently weak or malformed;
- Select tree stands with a large proportion of healthy vigorous and well-formed trees and collect seed from good trees;
- Trees for timbers should be tall, cylindrical and straight with light branching and no forking;
- Trees for fodder should be shorter, bushy with a large crown and dense foliage;
- Trees for firewood can benefit from abundant branching;
- All seed trees should have a reasonable amount of fruits.



### *Which method to use for collection*

Various methods may be used for collecting seed from different species. The collection method should be safe for the collector and should ensure the physiological quality of the seed.

#### ➤ **Natural seed fall**

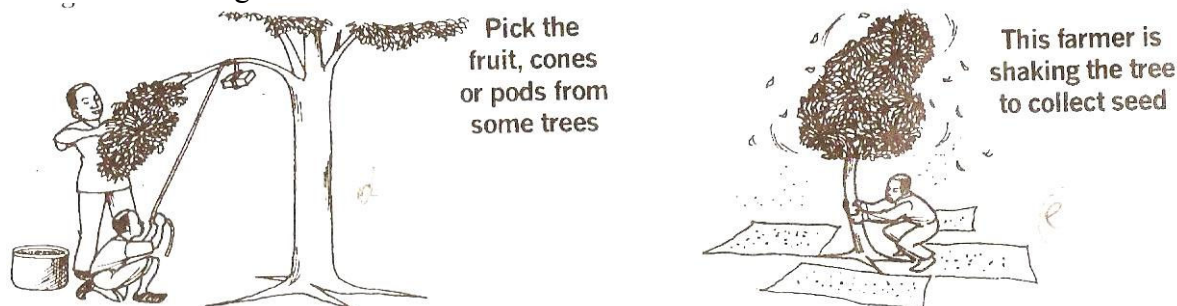
Collection from the forest floor of fruits which have fallen is common practice for species like *Fedherbia albida* and *Albizia lebeck*. The forest floor should be cleared first and a mat or “mkeka” should be spread under the tree. Trunks for small trees and low branches can be manually shaken to harvest fruits.

#### ➤ **Collection by tree felling**

Larger amounts of seed can be collected when normal commercial felling are done (and only in that case) provided the felling time is synchronized with fruiting time.

#### ➤ **Collection from standing trees**

For low-branched trees, fruits can be picked directly from branches. Some branches may be hooked using long handled tools such as pole primers, rakes, ropes and stones. Care should be taken not to damage trees.



### ➤ **Collection by climbing**

Collection by climbing is a very dangerous method and it is not recommended for individual farmers.

### **3. Seed processing and treatment**

Seed processing techniques vary from species to species:

- **For eucalyptus**, the capsules can be put in a container where they open, releasing the seed after some days.
- **For leguminous species like *Senna siamea*, the pods are dried.** Some release the seed after drying, but some species have to go through various stages of mechanical operation such as threshing or pounding to release the seed. After threshing or pounding, the seed is winnowed to remove the chaff. Thereafter, it can be cleaned manually.
- **Pulp fruits with stones such as *Melia azadirach*** can be pounded in a mortar followed by thorough washing of the stones in water. The stones can be air dried and tested for moisture content.

### **4. Seed storage**

- Orthodox seeds (seeds with a hard seed-coat) can be dried and kept for long periods without losing viability. It is important to dry such seed to a low moisture content with storage in airtight containers. This can be done for leguminous species such as *Fedherbia albida*, *Acacia* spp. and *Albizia lebeck*.
- Most leguminous seeds are prone to insect attack. Applying wood ash and/or *Tephrosia* dust can prevent insect damage. Protect stored seed from natural physiological deterioration, fungi and insects. Good storage containers and conditions will facilitate longevity of stored seed.
- Recalcitrant seeds (seeds covered by soft fruit like Ndyia, Neem) naturally have a short lifespan (from a few hours to a few months). These seeds respire actively and therefore require good ventilation and medium storage temperatures (about 15 to 30 degrees Celsius). Recalcitrant seeds usually have a high moisture content when they are shed. These seeds should be stored in cloth bags to facilitate aeration and should not be closely packed since this will generate heat and eventually lead to resumption of germination processes. Upon absence of favourable germination conditions, the seeds will die.

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## 2- Implementing and managing a nursery

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### 1<sup>st</sup> part: soil preparation and pot filling

This training will be mainly practical. All the participants should participate in the soil mixing and each farmer should try to fill a polytubes. The field officer should be present to demonstrate, to advise and correct when necessary.

#### 1. Materials needed for the training

For this training, the field officer will bring **2 watering cans** and the number of **polytubes** required, which will be given to the group.

When raising awareness about the training, the field officer must ask to the **farmers to prepare the following materials** needed to conduct the training:

- Top soil;
- Sand;
- Compost or khola manure;
- Water.

#### 1. Soil preparation

Mix:

- 3 parts of soil;
- 1 part compost;
- 1 part river sand (to improve drainage).

#### 2. Filling polytubes

Wet the soil mixture. Fill the tubes right to the top. Water slightly. If the level of soil in the polytube decreases, then add some more soil mixture in order to reach well the top. Water again after 2 to 3 days.

Arrange polytubes in blocks of 50x10 or 100x10 for easy counting and management. Bank soil or put broken bricks around to avoid tubes fall-off.

## 2<sup>nd</sup> part: seed treatment, sowing, nursery management

This training will be mainly practical. All the participants should practice the seed treatment in particular, which is quite delicate. The field officer should make demonstrations in order to show the necessary treatments.

### 1. Materials needed for the training

For this training, the field officer will bring the **seeds**, which will be given to the group. When raising awareness about the training, the field officer must ask to the **farmers to bring the watering cans and water** and to **make sure that the polytubes are ready and filled**.

### 2. Seed pre-treatment and number of seeds to be sown per tube

Species	Pre-treatment	Number of seeds per tube
Senna siamea (Kesha wa mirimo)	Nicking, hot/cold water	2
Senna spectabilis (Kesha wa maluwa)	Hot/cold water	2
Acacia polycantha (Mthethe)	Nicking / hot water	2
Melia azadarach (India)	Remove pulp, soak in cold water	1
Albizia lebeck (Mtangatanga)	Hot/cold water	2
Papaya	None (direct sown)	2

### 3. Shading

Young seedlings must be protected from direct sunshine. Provide shade by building frames over seed beds. Don't put a thick layer of grass. Gradually remove the shade as seedlings grow so that by the time they are ready to be transplanted, they are used to grow in full sunlight.

### 4. Nursery management

**Watering:** after sowing, water the tubes every morning and afternoon. Continue until seedlings are 3 weeks old. Then, reduce watering to mornings only. Avoid under or over watering.

**Thinning:** 2 weeks after germination, thin tubes to one seedling per tube (except on papaya). Don't disturb the remaining seedling. Replant empty tubes as needed.

**Weeding:** remove weeds from tubes and along pathways once in a week.

**Root pruning:** every 2 weeks, move the pots and check growth of the tap roots. Use a sharp knife or panga to cut tap roots that grow out of the pots. Final pruning should be done 3-4 days before outplanting to allow recovery.



## 3- Transplanting and establishment of woodlots

### 1. Introduction

#### *When to transplant the seedlings ?*

It is important to transplant in the rainy season, when reliable rains have set in (and after planting other crops in the field). Outplanting must be done early in the morning to avoid heat and high evapotranspiration, which may cause seedlings to wilt.

#### *Communal or individual woodlot?*

The trees for afforestation can either be planted in a communal woodlot or in individual woodlots. Both solutions can be chosen, depending on the situation. Before taking their decision, farmers can be reminded that the aim of the woodlots is to contribute to the preservation of the soils and to provide more source of wood. A communal woodlot in the village can also provide a source of seeds to the farmers who want to have their own trees around their fields or around their homes in the future.

### 2. Establishment of a woodlot

#### *Selection of the site*

The farmers have to select a site, in agreement of the owner of the land selected.

- Trees need good, rich soil (like crops do) in order to grow well
- Avoid areas which are waterlogged, extremely dry or where frost is known to occur

#### *Land preparation*

Land clearing is needed in open land or old gardens. The main advice is to prepare the planting site well in advance of rains. Important indigenous species such as *Pterocarpus angolensis* (Mlombwa), *Albizia lebbek* (Mtangatanga), etc. should not be cleared. The site should be cultivated manually to a depth of 15cm.

#### *Good management of the nursery before transplanting*

Prune small roots that have grown through the bottom of the tube by lifting pots off the ground every 2 weeks. The final pruning is 3-4 days before outplanting to allow recovery.

In case of delays in outplanting due to expected planting rains coming late, nursery management including watering, root pruning and removing weeds should be carried out. This process should continue until the seedlings are planted.

#### *Outplanting*

Outplanting must be done with care and foresight to minimize damage to young seedlings and to ensure optimal growth and survival. Before transplanting, the seedlings must be watered and make sure that they have recovered from any root-pruning. (Refer to the guideline).

*Recommended spacing:* the tree spacing is determined by the potential resource limitations such as soil, water, light and nutrients. This means using wider spacing in drier areas. The spacing is also determined by the intended end productivity (poles, firewood...) and by the type of species planted.

For example:

- the spacing for eucalyptus is 2m x 2m or 2.75 x 2.75m
- for other exotic species, the spacing must be at least 2.5m x 2.5m
- Some indigenous species such as Acacia species require as much as 5m x 5m.

In general, a wider spacing produces larger trees.

### 3. Management of the woodlot

#### *Management of the land*

When the seedlings are transplanted in the woodlot, it is important to continue to take care about the seedlings, with the participation of all the members of the group. In particular:

- Weeds should be removed, to avoid competition with the seedlings
- It is important to make a firebreak, which means to free the plants from all materials that might catch fire and to create a firebreak around the woodlot.
- Closer observations should be made for pests and/or diseases that might infest the seedlings while in the woodlot.

#### *Use / repartition of the wood*

To avoid problems among the members of the group, rules should be defined as soon as possible at the group level.

**References** : International Centre for Research in Agroforestry (ICRAF), Department of forestry (Government of Malawi)

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