



Module 6: Growing Fruit Tree Seedlings



Goal

Farmers will use appropriate nursery techniques to cultivate fruit seedlings for planting in their Forest Gardens.

Objectives

1. Learn how to prepare various fruit tree seeds for planting.
2. Learn fruit tree nursery establishment and seedling propagation techniques.
3. Learn fruit tree nursery management best practices.

Venue and Timing

This module should be facilitated three to four months before the start of the main rainy season. This workshop should take place on the lead farmer's or a participant farmer's farm. The farm should have a nursery site prepared prior to the workshop, with enough space for participants to meet and conduct training activities.

Relevant Technical Manual Chapters

Before this training event, the facilitator should read, review, and thoroughly understand the following chapters and sections in the Technical Manual:

- Chapter 4: Seeds
- Chapter 5: Seedling Propagation
- Chapter 6: Fruit Trees (Rearing Fruit Seedlings section)
- Chapter 11: Pruning, Harvesting, and Tree Management

Preparation

- Identify a nursery site (on the lead farmer's or a participant farmer's land) where the training will take place and inspect the site to make sure it is protected with a fence or otherwise safe from animals. The host farmer can use the agroforestry tree nursery site, if there were no problems with that location.
- Ensure that the site also has trees in green wall and alleys that are ready to be pruned and harvested.

- Select locally available fruit species, at least one to use as rootstock for grafting and at least one that does not need to be grafted, in addition to the species the group agreed to plant in Module 5.
- Decide which tree nursery (bareroot bedding, tree sacks) and seed pretreatment techniques (e.g. soak, scarify and soak, boil and soak, etc.) need to be covered with the group based on the fruit species selected.
- Ask the host farmer to prepare 5 fruit seedling sacks with multiple seedlings in each pot. These should be started about 4 to 6 weeks before the training event, depending on the species. The seedlings should be about 5 to 10 cm tall.
- Prepare seeds for planting if pretreatment requires overnight soaking or another process that cannot be completed during the workshop.

Supplies

- ½ wheelbarrow of wood ash
- ½ wheelbarrow of charcoal ash
- Screen material for sifting potting soil
- 5 sharpened, clean knives or pruning shears
- 3 wheelbarrows of sand or topsoil
- 2 wheelbarrows of compost or decomposed manure
- 15 tree sacks per participant (5 for the activity, 10 for the assignment)
- 5 spade shovels
- 3 watering cans
- 1 wheelbarrow of *Azadiractha indica* (neem) or *Eucalyptus sp.* leaves (where available)
- Ripe fruits of selected species for extracting seeds (a few per participant)
- 5 tree sacks with several germinated trees (~10 cm tall)
- 50 liters for watering seedlings
- String
- Any materials needed for pretreatment of selected species

Total Time

Approximately 4 hours

Handouts in Farmer's Workbook

- Pruning Correctly
- Fruit Tree Nursery

Module 6: Growing Fruit Tree Seedlings

Summary of Activities

Opener: Fruit tree nursery discussion (1 hour)

- Nursery siting
- Seed quality
- Germination beds
- Tree sack and bareroot nurseries
- Direct seeding and cuttings
- Protecting the nurseries

Activity 1: Establish a fruit tree nursery (1.5 hours)

- Form small groups
- Build nursery sites appropriate for the seeds selected

Activity 2: Extract and pretreat fruit tree seeds for planting (30 mins)

- Demonstrate how to extract seed from a fruit
- Why pretreat seeds
- Demonstrate pretreatment method for selected fruit trees
- Practice seed extracting and pretreatment methods
- Demonstrate how to extract and pretreat selected fruit tree seeds
- Practice seed extraction and pretreatment methods

Activity 3: Sow fruit tree seeds in the tree nursery (30 mins)

- Farmer demonstrates how to sow
- Farmers practice sowing

Activity 4: Fruit tree nursery care and maintenance (30 mins)

- Review best practices in nursery management
- Demonstrate thinning

Debrief and Take Home Activity 5: Build your fruit tree nursery (30 mins)

- Instructions for Farmers
- Follow-up

Opener: Fruit Tree Nursery Discussion

Description

Facilitator finds a shady, cool place to discuss considerations and best practices for identifying nursery sites, and raising seedlings in nurseries.

Instructions for Farmers

Before we begin the activities, let's talk about some important considerations when siting nurseries and raising seedlings.

1. Nursery siting

- Why would you put the tree nursery near your home? Why not in your field?
- What are the three most important things to look for when deciding where to place your tree nursery? (reliable water access, protection, and ease of access)
- What can damage your tree nursery?
- How do you prepare the nursery site?
- Did anyone have problems with their nursery site last year?

2. Seed quality

Seed quality determines the quality of the tree that grows from it, so pay close attention to where your seed comes from. Proper storage between harvesting and sowing the seed is also very important to ensure the seed is viable when you plant it.

- Why is seed quality important? (discuss genetic diversity and physical seed traits)
- How can you tell if a seed is likely to be good?
- How do you prepare the seed for storage? How do you store it? How long can you store it?
- Should you harvest seed from fruits that come from the same tree? Should they be from trees that are near each other? Why or why not?
- If you buy fruit from the market for extracting seed, should you buy all the fruit from the same vendor? Why or why not?
- In fruits with more than one seed, should you extract and plant multiple seeds from the same fruit?

3. Germination beds

- Which seeds are commonly sprouted in a small pot or germination bed?
- Why start seeds in a germination bed?
- Which types of seeds should you start in a germination bed?
- When do you transplant seedlings from germination beds to pots or trenches?
- How long do the selected fruit trees need to stay in the nursery before transplanting to pots or trenches?

4. Tree sack nursery

- Which trees are best raised in tree sacks?

- How do you prepare the potting soil for tree sacks?
- How do you fill the sacks? (how tightly to pack the soil)
- How do you prepare the land for the sacks? How do you arrange the sacks?
- How many seeds do you sow in each sack?
- How long do the selected fruit trees need to stay in the nursery before outplanting?

5. Bareroot nursery

- Which trees can be grown in bareroot beds?
- How do you prepare the beds? (How deep do you dig? How do you amend the soil?)

6. Direct seeding and cuttings

- Which fruit seeds can be direct seeded? How is it done (2-3 per hole)?
- Which can be propagated by cuttings? How?

7. Protecting the nursery

- What can attack the nursery (goats, termites, fungi)? What should you do to protect the nursery?
- Why is it important to protect a tree nursery from the sun?
- What locally-available items can you use to protect your nursery?
- How do you build a shade structure?
- How can you remove most weeds before planting our nursery?

Activity 1: Make a Fruit Tree Nursery

Description

Farmers form small groups and each group prepares a 1-meter x 1-meter tree nursery bed demonstrating nursery techniques appropriate for the seeds provided: sacks or bareroot.

Instructions for Farmers

1. Form small groups

Today we will build a tree nursery for fruit seedlings, similar to what we did last year for agroforestry seedlings. Make small groups of 4 farmers.

2. Build nursery sites appropriate for the seeds selected

For each seedling production method, each group will build a 1-meter square tree nursery with the materials I brought today. I will walk around and answer questions while you are building your nursery.

Activity 2: Treat Fruit Tree Seeds for Planting

Description

After small groups prepare tree nursery sites, the facilitator instructs farmers how to extract seeds from ripe fruits and treat the selected fruit seeds before planting. After instruction, farmers practice extracting and pretreating seeds themselves with monitoring and feedback from the facilitator.

Instructions for Farmers

1. Demonstrate how to extract seed from a fruit

We will use local fruits to extract seeds for sowing in our nursery. I will demonstrate how to open the fruit and remove the seed so that it is not damaged. Then you will practice.

- What are characteristics of a fruit to use for seed?
- How do you extract the seed from the fruit?
- Why do you use local varieties of fruit for seed?

2. Why pretreat seeds

We have prepared the nursery site. Now we will pretreat the fruit tree seeds for planting.

- How do you treat this type of fruit tree seed?
- What are two reasons to treat seeds before sowing?
- Do you need to remove all the fruit pulp from the seed? Why?

3. Demonstrate pretreatment method for selected fruit trees

I now demonstrate how to treat the fruit seeds we are planting today.

4. Practice seed extracting and pretreatment methods

Now you all will practice the techniques I demonstrated.

- Do all seeds need to be pretreated before sowing? Examples?
- What are different seed pretreatment methods? When do you pretreat seeds?

Activity 3: Sow Fruit Tree Seeds in the Tree Nursery

Description

Now that the nursery site and seeds are prepared, the facilitator requests a volunteer to demonstrate sowing techniques appropriate for the seeds provided. Farmers practice sowing.

Instructions for Farmers

1. Farmer demonstrates how to sow

For each nursery type, I would like a volunteer to demonstrate the sowing technique.

- What time of day is it best to sow seeds? Why?
- How deep should you plant the seeds?
- **Sacks:** How many seeds should be sown per sack?
- **Bareroot:** How should seeds be spaced in a nursery bed?

2. Farmers practice sowing

Everyone will now practice sowing using the techniques you learned.

- What spacing do you use for bareroot?

Activity 4: Care for the Fruit Trees in the Nursery

Description

Farmers review best practices for how to care for trees in the nursery using proper watering, weeding and thinning techniques.

Instructions for Farmers

1. Review best practices in nursery management

To produce healthy, vigorous fruit seedlings in your nurseries you need to take proper care of our seedlings.

- What are the three most important things to do to care for the tree nursery?
- How and when do you water the nursery?
- How and when do you weed the nursery?
- How and when do you move seeds from the germination bed to a sack or trench?
- How and when do you harden off the seedlings?

2. Demonstrate thinning

I would like a different volunteer to demonstrate how to thin fruit trees in the sacks I brought today.

- What do you do when more than one seedling germinates in a sack?
- What do you do when no seedlings germinate in a sack?
- What is the best method for thinning seedlings?
- Why do you thin seedlings? When?

Take Home Activity 5: Build your Fruit Tree Nursery

Description

Following the training, farmers are given 10 small tree sacks each (where applicable) and instructed to establish their nursery beds, construct shading, amend the bareroot beds, and fill the seedling sacks provided.

Instructions for Farmers

You will practice what you learned today and build a fruit tree nursery on your own farm within one week.

1. Prepare nursery site

Identify an appropriate nursery site, establish the nursery beds for bareroot (double-dug and amended) and potted seedlings, and fill the sacks provided with good potting soil.

2. Sack and seed distribution

If your nursery is in good condition when the lead farmers comes to inspect it, the lead farmer will give you more tree sacks for your nursery.

If your dead fence is in good condition, the lead farmer will also give you agroforestry seeds for you to raise in your nursery to continue planting your green walls and alleys/contours.

3. Obtain fruits for seed extraction

You will be responsible for obtaining the fruits and extracting and pretreating the seeds for your nursery. In preparation for the lead farmer's visit, you will be expected to obtain, through harvesting or purchasing, several fruits of the species you will be sowing.

Follow-up

Prior to visiting each farmer, the lead farmer will call to inform the farmer of the visit so that he/she can obtain the fruits prior to the visit. When the lead farmer visits participants, he/she will ask the farmer how and where the fruit was obtained, then observe and counsel participant farmers to extract, pretreat and sow several seeds, ensuring proper technique. When the lead farmer is satisfied with the farmer's knowledge and practice, he/she will distribute 10 more tree sacks (where applicable).

Evaluation Checklist for Skills Learned in Module 6



At the end of the year you will be evaluated on the following practices that you learned and discussed during training events. Those in bold are topics that we discussed or practiced today. In demonstrating that you have completed the Year two evaluation criteria, you will be invited to continue into the third year of the project.

Year 2 Evaluation Criteria

- Green Wall
 - At least two rows planted, surrounding the entire site
 - At least part of the third row is planted
 - Dead trees and gaps from the first year are replanted
 - Proper spacing between rows
 - Proper spacing between trees within rows
 - Woven branches
 - Pruned into a hedge
 - Brush and weeds cleared
 - Dead fence surrounding green wall (for all projects where this is determined to be a requirement)
- Alley Cropping and/or Contour Planting
 - Minimum of 3 rows planted across cropping area
 - Agroforestry trees interspersed throughout site
 - Proper spacing between rows
 - Proper spacing between trees within rows
 - Contour lines followed (on sloped sites)
 - Coppiced or pollarded in year 2
- Fruit Trees
 - At least 3 species of fruit trees/plants
 - Proper spacing between fruit trees planted
 - Trees appear to receive enough water
 - Each tree is weeded and mulched
 - At least 2 species of fruit root stock growing
 - Fruit trees for grafting are transplanted from beds to sacks or trenches
- Compost
 - Three active piles
 - Passes stick test
 - Demonstrated product and use
- Permagarden
 - Raised or sunken beds
 - Amended soils, Mulching
 - At least six species/types
 - At least two new species/types that were not planted previously by family
 - Rotation planting

Module 6: Facilitator's Notes



The facilitator should use the following pages to note down any questions or findings from the group that should be kept for or addressed at a later time. Depending on the module this may include species selection by group, crops identified in seasonal calendars, or anything else that should be noted.