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# **Module 2**

## Establishing the nursery

## What is a fruit tree nursery?

A nursery is the starting point for successful fruit tree planting. In the nursery, you can carry out the following activities:

- plant seedlings
- raise rootstock
- multiply improved varieties
- do grafting and budding
- take care of delicate fruit tree seedlings
- multiply rare types of fruit trees
- generate income on a small plot

The nursery is an area for producing good quality trees. It is better to produce a few trees of high quality than many trees of poor quality.

**Why are seedbeds used?** They are used

- in selecting seedlings of uniform size for transplanting
- when the seeds are old, or when the germination rate is low or unknown
- if the seeds cannot be stored for a long time, such as citrus seeds
- if planting containers are not available

## Main steps in establishing a nursery



*Ask farmers—*

- Which fruit trees do they know?
- Which fruits have good markets?
- Which fruit trees would they like to plant in their field and why?

*Discuss advantages of fruit trees and fruits.*

It is important to set up a strategy before you set up a nursery. Identify the reasons why the nursery is being established. Is it a small kitchen nursery (about 50 seedlings), a small-scale nursery (up to 1000 seedlings) or a commercial nursery (more than 1000 seedlings)?

The main activities you carry out to establish a nursery are the following:

- select and prepare the site
- select and treat seed or planting material
- plant seeds or cuttings
- prepare mulching materials

Discuss with the farmers:

- which type of fruit tree they want to grow—for example, mango, citrus

- which cultivars are in high demand (such as for mango: Tommy Atkins, Kent, Keith; for citrus: Washington Navel)
- how many trees they need for planting and selling; how many fruit tree seedlings they want to produce per season
- the market demand for fruits and trees
- who has a suitable nursery site?



*The trainer may ask the following questions:*

- Which nurseries are operating in your area?
- Which types of trees are raised?
- Are the nurseries successful?

*What is the farmers comment on the existing nurseries?*

#### **Nurseries in our area** (a table you can fill in with the farmers)

Location, village, market	Name of owner	Which trees and cultivars are raised	Comments of farmers
Mbeere, Siakago	Mr Daudi	<ul style="list-style-type: none"> <li>• mango: Kent, Keith</li> <li>• pawpaw: Solo, Sunrise</li> <li>• outstanding local cultivars:</li> </ul>	<ul style="list-style-type: none"> <li>• very far from some farmers' villages</li> <li>• too few trees available</li> </ul>

(continue filling in the table with the farmers)

#### **General remarks**

Before beginning, consider these important points:

- A fruit tree nursery needs a lot work. You must water the trees every day. Sometimes family members can help.
- The fruit trees in a nursery have to be clean and protected to keep them free of pests and diseases.
- Start with realistic targets. Raise a small number of fruit trees successfully first, before investing more capital.
- Seedling trees will be ready for planting after 6 months, grafted trees after one year. How soon you have trees ready for planting out depends on the type of tree that you grow and your management.

### Seeds can be planted either in a nursery or directly on the farm

#### Direct seeding on farm

- Plant fruit seeds on your farm.
- Do grafting or budding later.
- You need very few inputs.
- Some trees may die on the farm.
- Some graftings may not take in this system.



*Direct seeding*

#### Kitchen nursery

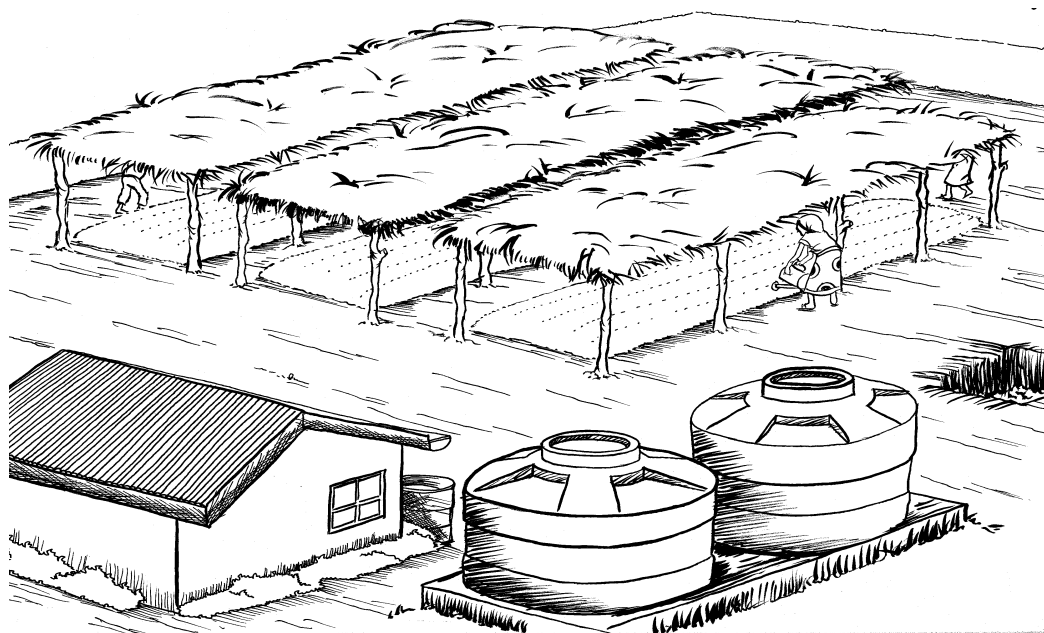
- A small nursery kept next to the house.
- Size—for planting 50 to 200 fruit trees.
- Needs few inputs.
- Purpose—for planting on the farm and for selling some plants.
- Results are better than from direct seeding because the seedlings get more attention.



*Kitchen nursery*

#### Small-scale nursery

Nursery for 200 to 2000 fruit trees.  
 Needs several inputs and good care.  
 Good for in-village nurseries and selling.  
 Can be run as a group nursery.  
 Requires more planning and labour than the previously mentioned methods



*Small-scale nursery and site selection*

## Selecting a site

Criteria for selecting a suitable production site for your fruit tree nursery:

- The site should be level.
- It should be safe from erosion, floods or heavy winds—that is, you will need windbreaks.
- It must be fenced to protect it against damage from animals.
- It needs a permanent water supply.
- You must ensure supervision and security.
- It must be near a road for transport of inputs and plants and ready access by clients.
- The soil used must be free of soilborne diseases and pests, such as nematodes.
- Local construction materials, such as wood, bricks, poles and banana stems, should be available.
- Labour to manage the nursery must be available.
- Well-rotted farmyard manure, sand or decomposed sawdust, compost or fertile topsoil for soil mixture must be available.

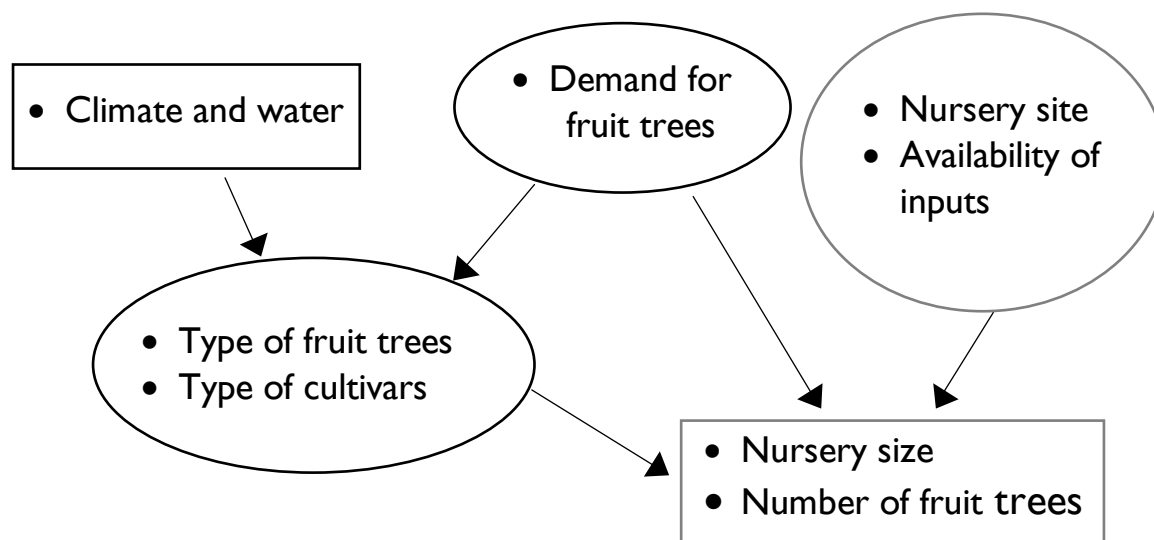
## Commercial nursery

- Size is for more than 2000 fruit trees.
- Full management and investment of both skills and capital are necessary.
- A large commercial nursery will be useful only if the demand for fruit trees is high.
- For a large-scale nursery, of 10,000 plants a season, you should draw a sketch map first that indicates where the store, nursery beds, paths, shadehouse, and so on, will be located. A good layout plan will increase efficiency of work such as transporting soil, watering or moving trees in the nursery).



Ask farmers about their own experience in raising fruit trees. How do they do it? What problems occur?

## On blackboard or flipchart



These factors influence the decisions for establishing a nursery. According to the temperature and the availability of water, you can determine which type of fruit tree seedlings you can raise. Then find out whether you have a suitable site. If you plan to sell trees, consider your markets.

## Inputs and tools

You will need these tools and supplies to operate a small-scale nursery:

### For preparation

- hoe (jembe)
- shovel (cheppe)
- watering can
- bucket (debbe)
- rope or measuring tape

### For potting

- containers—polytubes, empty tins, banana fibre or any local system
- soil sieve
- pruning saw

### For preparing the soil media

- fertile topsoil—from forest or compost
- sand or sawdust
- well-rotted farmyard manure

### For construction

- hammer
- saw or panga
- nails
- simple construction materials
- fencing—local material or wire

### For grafting, budding, pruning

- pruning secateur
- grafting knife
- sharpening stone
- basin or bucket

### For plant protection

- knapsack sprayer
- fungicide, insecticide



*Some equipment and tools are expensive and farmers do not have them.*

*What tools can be improvised, such as a tin for watering?*

*Discuss and do not promise farmers inputs free of charge if you can't provide them!*

Now farmers should be in a position to know and decide whether they can start direct seeding or a small nursery and for which fruit trees.

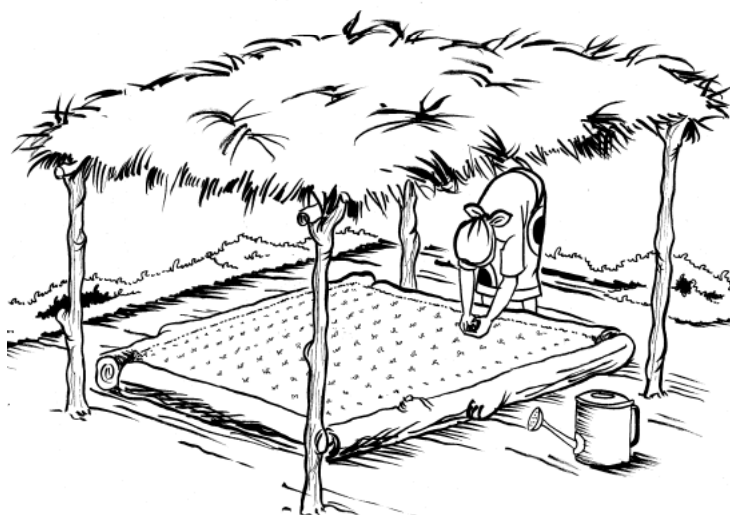
## Preparing the site

- Level the site or eventually terrace it.
- Properly weed and clear the plot.
- Ensure good drainage and avoid areas prone to waterlogging.
- Fence the plot to protect against damage from animals.
- Prepare sticks to mark your footpaths and seedbeds.
- A seedbed, container bed or propagation bed should have
  - the length you want
  - a width of 1 m (3 ft), so that you can reach all plants easily

## Types of seedbed

### Raised seedbed

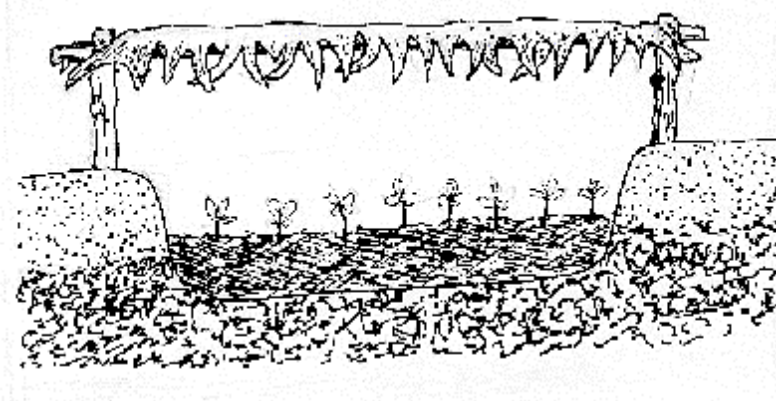
- For humid conditions
- Good in rainy season to avoid waterlogging
- Fewer insects
- Good aeration
- Easy to manage, for weeding, pricking out
- Simple shade roof
- Protective fence
- 1-metre width
- Length as you choose
- Frame constructed of any local material



*Raised seedbed*

**Sunken seedbed**

- Good water retention for dry conditions
- Less evaporation
- Simple shade roof
- Protective fence needed
- 1-metre width
- Length as you like
- Frame needed, made out of any material
- Waterlogs with excessive rain
- Management practice tedious

*Sunken seedbed under shade***Soil media and soil mixtures**

For seedbeds, nursery beds and planting containers, you need clean, fertile soil.

*Trainer's questions:*

- Which soil media do farmers normally use for planting?
- Which soils do they have in their farms?
- What other fertile soil media do they know?

The soil components have to

- be free of all disease
- be light, for the roots to sprout
- hold moisture, but drain well
- supply all nutrients needed for the seedlings to grow

The basic ingredients are topsoil and well-decomposed animal or compost manure.

Points to remember in preparing the soil:

- For good water movement in the soil, use coarse sand, well-decomposed sawdust, coffee husks or rice husks—whichever is available. Farmers can experiment with other materials available in their locality.
- Manure that is not well decomposed is harmful to plant roots. The gases it produces burns them.
- Remove sticks, stones and litter manually or by using a soil sieve.
- Mix the components very well, as if mixing cement for construction.
- Measure the components according to the ratios given on the next page.
- Use the same tool to measure all of the different components—such as a bucket, a wheelbarrow, a tin or a shovel.

## How to make compost—the pile method

1. Select an area sheltered from wind, rain, sun and runoff. The compost should be neither too wet nor too dry.
2. Measure a rectangle 150 cm long and 120 cm wide, depending on the amount of compost you want to make.
3. In dry areas, dig a pit about 30 cm (1 ft) deep and put the soil on the side. In very wet areas, make the pile on the ground surface.
4. Begin by laying down a bottom layer, 30 cm thick, of rough materials, such as maize stalks and hedge cuttings. Sprinkle water on this layer.
5. Make up the next layer of dry vegetation such as grass. The layer should be 15 cm thick. Sprinkle water on this layer as well. All layers should be moist—but not wet—at all times.
6. Use animal manure to make up the third layer (15 cm thick). Sprinkle ash or dust on it. Ash contains minerals that are beneficial to the crops.
7. Use green material such as green leaves to make up the fourth layer. It should be 15 cm thick. Sprinkle a little topsoil or old compost on it.
8. Build the pile up to 1.5 m high by repeating steps 3 to 7.
9. Cover the whole pile with 10 cm of topsoil, and then place dry vegetation such as banana leaves or dry grass on the pile.
10. Drive a long, sharp stick at an angle all the way to the bottom of the pile. Remove this stick every 3 or 4 days to check if the pile is decomposing. If the stick is warm, decomposition is still going on. Use the stick to check if the pile needs more water.
11. If after 2 to 3 weeks, the stick is cold or has a white substance on its surface, turn the pile over layer by layer. Do not add any fresh material except water.
12. The compost should be ready in 4 weeks.

## Soil mixture ratio

Fertile topsoil 2 parts	Sand or decomposed sawdust 1 part	Farmyard manure 1 part
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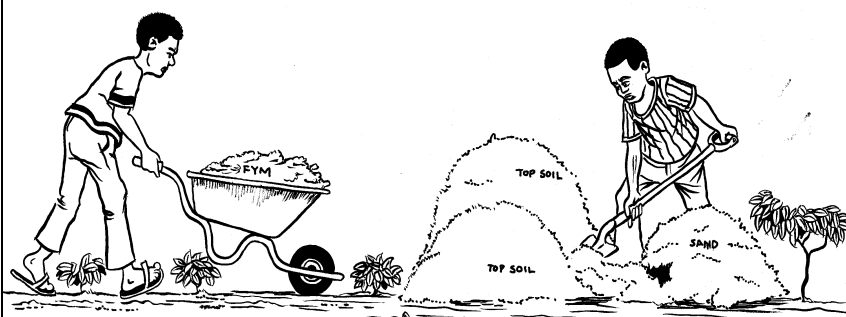
Considering the type of topsoil you may have, use this combination:

Your soil type	Use these ratios		
	Topsoil	Sand or rotted sawdust	Manure
Heavy (clay)	1 part	2 parts	2 parts
Medium (loam)	1 part	1 part	1 part
Light (sand)	1 part	0 part	1 part

Determine the quantity of soil media you need according to the number of seedlings you want to raise. To fill about 700 1-kg (about 13 × 18 cm) containers, you will need 10 to 12 wheelbarrows or 40 to 50 buckets of readymade soil mixture. To prepare 1 square metre of seedbed with a depth of 25 cm, you will need 15 to 16 buckets of soil media. You can use the soil either to prepare a seedbed or to fill polytube containers.

**Soil mixture**

- 2 parts topsoil
- 1 part farmyard manure
- 1 part sand
- Check table on previous page for specific type of topsoil
- Mix thoroughly to ensure uniformity of components

*Soil preparation**Practical exercise: Nursery visit*

*Walk through the nursery. Let farmers discuss the site location. Which advantages and disadvantages do they discover? Involve the nursery owner and find out the problems the owner faces.*

*Which fruit trees are propagated? Which cultivars? Why these? How are they selling? Which species are problematic? What is the nursery output? What labour is required? Is the business profitable?*

*Prepare a soil mixture.*

*Demonstrate how to prepare a seedbed.*

*Fill some containers.*

You can now continue with the first two modules on fruit propagation: 'Seed', and 'Cuttings, stooling and layering'. Later, you can introduce the module 'Grafting and budding'.