SET
Skills for Employment Tanzania

Trainer Guide

Fruit Seedling Production

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DISCLAIMER

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Swisscontact

Swisscontact works in Tanzania as a facilitator in skills development to complement government efforts in youth empowerment.

Economic, social, and academically disadvantaged youth are supported through tailor-made vocational skills development opportunities to increase their employment chances and entrepreneurship opportunities. Projects are guided by a unique youth and market-driven learning group model, which is focused on sub-sectors and jobs which have a potential to offer (self-)employment opportunities. These are agriculture/agribusiness, and other rural trades or services.

Swisscontact projects in Tanzania employ an Inclusive Markets system approach which considers the limits and opportunities of the existing vocational skills development system. Projects seeks to improve the prospects of self-employment among the youth through a sustainable and systemic contribution to improved access, relevance, and quality of vocational skills development. Since ownership is critical for sustainability, our projects apply a participatory approach which involves joint action planning with partners.

Introduction for Trainers

This training course is designed to equip participants with the practical knowledge and skills needed to establish and operate a small fruit seedling nursery. It targets youth and community members, especially those with limited formal education, who are looking for self-employment or income-generating opportunities in agriculture.

The training introduces learners to the full cycle of nursery operations—from selecting a site and preparing growing media to sowing, propagation, and managing seedlings for sale. Participants learn how to grow seedlings of key fruit trees like avocado, mango, citrus, and papaya, using affordable, locally available materials and tools.

The course responds to growing demand in Tanzania for quality fruit seedlings due to rising local consumption, nutrition awareness, and expanding export markets. It also contributes to environmental goals by encouraging tree planting and improved land use.

As a trainer, your role is to provide practical, hands-on training and support that builds learners' confidence and capabilities. The course is structured for 80% practical learning, ensuring participants are fully engaged in real-life nursery work and can apply their skills in their communities or as part of a commercial venture.

By the end of this course, learners will be able to establish and run their own small-scale nursery or find work in an existing one, supporting the national push for sustainable agriculture and youth employment.

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Training Objectives

This training will equip participants to establish and manage a small-scale fruit tree seedling nursery.

Participants will gain skills to:

- Produce healthy fruit tree seedlings for sale or own use.
- Participate in related activities such as:
    - Supplying nursery inputs (e.g. polybags, compost, tools).
    - Grafting or budding services for other nurseries or farmers.
    - Buying and reselling seedlings to different markets.
    - Advising others in the community on nursery practices.

Learning Outcomes

By the end of this course, the learner will be able to:

- Explain the value chain and business potential of fruit seedling production.
- Identify types of nurseries and select a suitable site.
- Prepare growing media and containers for fruit tree seedling production.
- Sow and manage seeds for avocado, mango, orange, and papaya.
- Carry out vegetative propagation:
    - Grafting for avocado and mango.
    - Budding for orange.
    - Seed-based propagation and selection for papaya.
- Manage watering, fertilization, pest and disease control in the nursery.
- Practice good nursery hygiene, planning, and recordkeeping.
- Identify quality seedlings for sale and prepare them for transport.
- Market and sell fruit tree seedlings to different buyers.
- Start or improve a small fruit seedling nursery business.

Training Plan

Training model: Full-time training for up to 19 days conducted either in or with access to an existing, operating fruit seedling nursery with nearby suitable space for classroom training. The training *may* result in the establishment of a new nursery by the learner group. The first 'generalist' modules are delivered in 7 days, followed by 3 days for each of the specific fruits. Based on the location of the training, the trainer will present modules only on the fruits that grow or are in demand in the training location.	
Practical: 80%	**Theory:** 20%
Group size	Maximum 25 trainees who work in groups of 5.
Training location	This training may be delivered in peri-urban and rural areas.
Training venue	Theory training in a classroom environment with space for practical activities to be conducted. The practical training (internship) must be conducted at an existing fruit seedling nursery in good condition.
Course duration	This course is divided into general nursery training, then applied training for specific fruit trees: • **General training**: Modules 1 – 7: 7 days • **Fruit modules**: Modules 8 – 11: 3 days each. The course duration is a minimum of 10 days (only covering 1 type of fruit seedling), and up to 19 days (covering all 4 types of fruit seedlings). This includes both classroom-based and practical training delivery.
Trainee profile	This training is open to any participants, but the content was developed for youth with low income and education levels in mind.
Attendance	80% needed for certificate of attendance

Course Content

Course content	Theory time	Practical time	Assessment
Module 1: Introduction	1.5	1.5	**3**
Module 2: Nursery Establishment	1.4	1.6	**3**
Module 3: Sowing Seeds	1.4	4.6	**6**
Module 4: Nursery Operation	1.8	10.2	**12**
Module 5: Propagation	1	5	**6**
Module 6: Nursery Management	1.4	7.6	**9**
Module 7: Marketing and Sales	1.1	1.9	**3**
One or more of the following modules: 3 days each			
Module 8: Avocado	1.8	15.7	**17.5**
Module 9: Mango	(1.8)	(15.7)	**(17.5)**
Module 10: Orange	(1.8)	(15.7)	**(17.5)**
Module 11: Papaya	(1.8)	(15.7)	**(17.5)**
Assessment			**0.5**
Total hours	**11.9**	**48.6**	**60**

Assessment

The emphasis is on practical assessment to ensure that trainees acquire practical needed to produce fruit tree seedlings.

1. **Skills assessment**: ongoing practical assessment of fruit seedling growing skills using a spreadsheet checklist. All learners must achieve all competencies during the training programme.
2. **Knowledge assessment**: learners take a short theory test (written or verbal) at the end of the course.

Training Programme

Interactive 'theory' based lessons with product and equipment demonstrations and activities	**Practical lessons:** Demonstration and practice of producing fruit tree seedlings.

Suggestion: Be flexible about timetabling and planning the lessons, keeping the weather/season and practical activities in mind. Practical may take place in the morning when it is cool in the nursery, and theory lessons to follow towards midday and afternoon when it is too hot for nursery activities.

Learners conduct ongoing nursery activities during the times when they are not doing specific classroom or practical training – they assist with watering, weeding, potting, scouting and other such daily activities to develop their skills, competence and confidence.

Day	Classroom training (theory)	Practical
1	Module 1: Introduction	Site visit to/in a nursery
	Module 2: Nursery Establishment	Identification test: Tools & Equipment
2	Module 3: Sowing Seeds	Sowing seeds
3	Module 4: Nursery Operations	Watering/irrigation; fertilising; pest and disease control
4	Module 4: Nursery Operations	Weeding; thinning; pruning; scouting
5	Module 5: Propagation	Grafting and budding
6	Module 6: Nursery Management	Money management, stock control,
7	Module 6: Nursery Management (cont) Module 7: Marketing & Sales	Recordkeeping Design marketing materials

Day	Classroom training (theory)	Practical
8	Module 8/9/10/11: any of Avocado, Mango, Orange or Papaya: Varieties; seed selection and prep; potting prep	Seed selection Seed preparation and treatment Prepare soil and media Potting
9	Sowing; growth conditions; pest control, disease control, fertiliser needs	Sowing Pest and disease inspection and control Fertiliser application (existing seedlings)
10	Propagation, hardening off, quality of seedlings	Grafting or budding Quality points of seedlings: assess seedlings for sale – quality check
	Short theory assessment	

Module 1: Introduction to Fruit Seedling Production

Topic	Time	Training Instructions	Resources
1.1 Demand for fruit and trees	12 min	**Activity 1: Fruit Brainstorm and Discussion** 1. Run a quick brainstorm with the question: *How many fruits can you think of that we grow and enjoy here in Tanzania?* 2. Write the answers up on the board or flipchart. 3. Ask the next question: *How many of these fruits grow on trees?* 4. Go one by one down the list you created and circle each fruit that is grown on a tree. Add them up. 5. Next question: ask: *Where do these trees come from?* 6. The answers will vary as some fruits grow wild but the answer of 'from a nursery' should come up too. 7. Ask: *Is fruit popular in Tanzania – and why is this*? Facilitate a discussion around the popularity of fruit, and the demand for fruit – and the trees that fruit grows on. 8. Summarise by presenting a short lesson on: a. The health benefits of fruit b. Growing domestic demand for fruit and fruit products: reasons and drivers c. Export market expansion	Flipchart and markers, or board and chalk

Topic	Time	Training Instructions	Resources
		d. Environmental benefit from planting trees as they absorb carbon.	
1.2 Fruit tree value-supply chain	24 min	Present a short lesson on the fruit tree seedling value chain and each of the elements of the production process. **Activity 2: Flashcards: The Fruit Tree Journey** 1. Give each learner (or small groups) a role card. 2. Ask them to stand in a line according to the order of the value chain – they must work it out themselves, with the objective of coming up with the following sequence: Suppliers → Nurseries → Transport → Farmers/Other Buyers → End Users. 3. Once ready, ask each person/group to say **one thing they do** in the value chain (e.g. "We supply polybags," "We graft mango seedlings," "We buy seedlings for planting," etc.). 4. Show how the "journey" flows by passing a seedling picture (or even a leaf/stone/seed (e.g. mango or Avocado seed) as a symbol) from one person/group to the next along the chain. 5. Finish by discussing: *Where does the value increase? Where can things go wrong? Who depends on whom?*	Flashcards in the Training Resources section
1.3 Opportunities in fruit tree growing	12 min	**Activity 3: Brainstorm & Discussion: Opportunities for Employment and Income**	

Topic	Time	Training Instructions	Resources
		1. Ask the learners, now that they have seen the value chain and the actors in the system, what jobs or opportunities they may see for themselves in that whole space. 2. Facilitate a brainstorm and discussion on the opportunities for employment or income generation in growing fruit tree seedlings. 3. Answers should include the following: • **Primary** occupation opportunities: o Running own nursery: self-employment o Working in a nursery: employment • **Secondary** opportunities: o Supply various inputs or services to other nurseries o Provide some technical assistance/support to other growers	
1.4 What is a fruit seedling nursery?	120 min	Give a short lesson on what a fruit tree nursery is and what it does. **Activity 4: Site Visit: Fruit Tree Seedling Nursery** 1. Take the learners on a tour of a fruit tree seedling nursery. 2. Show them all the sections and explain what takes place in each, starting at the beginning of the growing process – the potting, and then sowing, etc. 3. Show them additional facilities including administration, storage, water holding etc.	Access to a fruit tree seedling nursery

Topic	Time	Training Instructions	Resources
1.5 Challenges	12 min	Explain that nursey operation has some challenges that they may face, and that they must be aware of. Explain these challenges using the following activity. **Activity 5: The Heavy Basket** 1. Place all the challenge cards in the basket. 2. Ask one learner to carry the basket. Explain: *"This is a nursery operator. These are the challenges they face."* 3. As each challenge is read out, add a stone to represent weight, into the basket. The basket gets heavier. 4. Ask the learner carrying it: *"Is it heavy? Is it easy to run a nursery with many challenges?"* 5. Discuss briefly: Which challenge feels the heaviest in real life? Which ones can be shared, solved, or reduced with good practices? **Outcome:** Learners see that running a nursery comes with many challenges, but also that challenges can be managed when shared or addressed.	Pieces of paper with challenges written on them. A box, basket or bag Heavy stones

Module 2: Nursery Establishment

Topic	Time	Training Instructions	Resources
2.1 Types of nurseries	18 min	Present a lesson, with pictures (PowerPoint or printed pictures) of the different types of nurseries. Discuss what they are usually used for, and the benefits and challenges of each.	Photos of different types of nurseries
2.2 Site Selection	30 min	Explain the importance of selecting a good site for a fruit seedling nursery, and the criteria to be considered when choosing a site (if they are not, by default, using the land where they live). **Activity 6: Choosing the Best Tree Nursery Site** **Preparation**: Draw 3–4 simple "site pictures" (or describe them). For example: • **Site A:** Near a road and market, but soil is poor and little water. • **Site B:** Good soil and water, but far from buyers and area of high theft. • **Site C:** Fertile soil, close to water and buyers, but on a steep slope. • **Site D:** Flat land, good water source, near market, protected by a fence. **Steps:** 1. Divide learners into small groups and give them the site descriptions/pictures.	Example pictures in Training Resources section

Topic	Time	Training Instructions	Resources
		2. Each group discusses the strengths and weaknesses of each site, using the listed factors: access, climate/sunlight, topography, water, protection, security, pest/disease history. 3. Groups then choose the site they think is best and explain why. 4. As a class, compare choices and highlight the importance of balancing all factors.	
2.3 Nursery components and layout	48 min	Refer to the site visit conducted in Module 1, Activity 4. Remind the learners of the layout and different sections of the nursery. Explain each section in more detail and what the general guidelines for good practice for these sections are. **Activity 7: Design Nursery Layout** 1. Draw an example on the flipchart or board. 2. Instruct the learners to think about the site that they may have in mind for a nursery (e.g. at home or a nearby location they may know of) and to draw a diagram of how they would lay out their nursery in that space, following the guidelines given.	Sample picture provided in Training Resources section
2.4 Equipment and tools	72 min	**Activity 8: Identification Test: Nursery Tools and Equipment**	A range of about 15 tools, equipment and resources (e.g. polytube) that is

Topic	Time	Training Instructions	Resources
		1. On a table or clean floor, lay out a selection of different all the tools, equipment and resources (e.g. polytube) that is used in a fruit seedling nursery. 2. Put a small number next to each item. 3. Give each learner a sheet of paper and ask them to write numbers down the left margin. 4. Instruct them to try to identify each of the items laid out and write their name and their use on their sheet of paper. 5. Give them 10 minutes to do this. 6. After 10 minutes, starting with number 1, ask them what they think the item is. 7. Make it fun like a TV quiz. If they identify it correctly, they get a point; if they understand and have noted its use in feed, they get another point. 8. Go around asking and explaining, showing what all the items are. 9. Allow learners to see, touch, handle the items to become familiar with them. 10. They must give themselves 1 point for each one that they get right. 11. At the end, ask who got the highest number of points, and give them a small prize e.g. some wrapped sweets.	used in a fruit seedling nursery Numbers on slips of paper Small prize for the winner/s
2.5 Security (human and animal)	12 min	Discuss the importance of basic security in a nursery, and what the potential security risks are. **Activity 9: Discussion and Security Checklist Walk**	Copies of checklist in Training Resources section

Topic	Time	Training Instructions	Resources
		1. Ask: "*What has happened in your community when a nursery or farm was not secure?*" 2. Let learners share real stories of goats breaking in, or tools being stolen. 3. Then connect these experiences to the need for nursery security. 4. Give learners the simple checklist with items: fence, gate, lock, store, guard. 5. Take them outside to the nursery and ask them to "inspect" the area. 6. They tick what is present and discuss what is missing.	

Module 3: Sowing Seeds

Topic	Time	Training Instructions	Resources
3.1 Prepare soil/media	72 min	Present a lesson on soil and media and include this activity as part of demonstration so that learners can observe, touch, and compare different soil types and organic media, and learn how to prepare a good nursery soil mix. **Activity 10: Soil and Media Identification & Mixing** 1. **Soil demonstration** • Show learners each soil type (sand, clay, loam). • Ask them to touch, rub between fingers, and note characteristics: ○ Sandy: drains quickly, gritty, no shape. ○ Clay: sticky, holds water, can be rolled into a ball. ○ Loam: crumbly, dark, holds some water, best for seedlings. • Discuss: *Which soil type is best for nursery media? Why?* 2. **Organic components** • Show rice husks, sawdust, manure, coco peat, etc. • Ask: *What role do these play?* (e.g. manure = nutrients, husks = structure, coco peat = water holding). 3. **Soil preparation**	Samples of **different soil types**: • Sandy soil • Clay soil • Loam soi) Samples of **organic components**: rice husks, sawdust, manure, cocopeat (or locally available alternatives). Simple containers/ basins for mixing. Water in a jug or can. Sieves (wire mesh) to demonstrate cleaning of soil.

Topic	Time	Training Instructions	Resources
		• Demonstrate sifting soil through a mesh to remove stones and debris. • Add measured portions into a basin: e.g. 3 parts soil + 1 part sand + 1 part manure. • Mix thoroughly while learners watch and then invite them to mix in groups. • Sprinkle water to show how the mix should be moist but not waterlogged. 4. **Discussion** • Ask learners to suggest where each component could be sourced locally (sandpit, rice mill, livestock farmer, sawmill, etc.). • Discuss why sterilising (heating or treating) is important to kill pests and diseases.	
3.2 Potting	72 min	Explain the containers, principles and processes of potting. The run the activity so that learners practise filling containers with prepared media and arranging them correctly in nursery rows, while also learning to keep simple records. **Activity 11: Demonstration and Practice: Potting** 1. **Trainer Demonstration** • Show learners the different containers (polytubes vs trays). • Demonstrate how to: ○ Open polybags and check drainage holes.	• Polytubes/polybags (10–20 cm high, 8–10 cm diameter). • Seedling trays with cells (plastic or locally made). • Prepared nursery media (soil, sand, manure mix). • Small hand tools (cups, spoons, or

Topic	Time	Training Instructions	Resources
		○ Measure and cut polytubing; or use precut pieces ○ Hold the bag/tube upright and fill with prepared soil mix. ○ Press soil lightly in the bottom two-thirds (firm but not compacted), leaving the top loose for sowing. ○ Fill seedling trays evenly to the top of each cell. • Show how to arrange filled containers in straight rows or nursery beds for easy watering and movement. 2. **Learner Practice** • Divide learners into small groups. • Each group fills a set of polybags/polytubes and a tray with soil mix. • Learners arrange their containers neatly in rows. 3. **Recordkeeping Exercise** • Give each group a small set of labels. • Ask them to label their containers or trays with the date, crop/seed type, and group name. • Demonstrate how to enter the same information into a nursery logbook. 4. **Review and Discussion** • Compare the work of different groups: Which bags were filled evenly? Which trays look neat? • Ask: *Why is it important not to over-compact soil? Why must containers be arranged neatly? Why do we record this step?*	small trowels for filling). • Labels (sticks, tags, or paper). • Logbook or simple record sheet.

Topic	Time	Training Instructions	Resources
3.3 Seed selection	54 min	Present a lesson on seed selection and the quality of seeds. Include the activity as part of the learning process so that learners practise identifying high-quality fruit tree seeds through observation and understand where to source them. **Activity 12: Demonstration and Practice: Seed Quality** 1. **Trainer Demonstration** • Show learners two seeds side by side: one good quality, one poor. • Point out key observable features: size, colour, firmness, no holes, no mould. • Explain how poor seed leads to weak seedlings or total failure. 2. **Group Practice** • Divide learners into small groups. • Give each group a mixed sample of seeds. • Ask them to sort seeds into two piles: **Good Seed** and **Bad Seed.** 3. **Discussion** • Groups present their sorted seeds and explain why they classified them as good or bad. • Trainer corrects mistakes and reinforces the observable criteria (maturity, condition, no pest/disease). 4. **Extension (if time allows)**	Mixed seed samples (avocado, mango, orange, papaya, other): • Mature, healthy seeds (correct size, colour, firm). • Immature seeds (too small, soft, pale). • Damaged seeds (holes, cracks, shrivelled). • Seeds showing pest/disease attack (mould, webbing, discolouration). Hand lenses (if available), or magnifiers on smart phones Flipchart or chalkboard.

Topic	Time	Training Instructions	Resources

		• Discuss **seed sourcing**: ask where learners usually get seeds (farm, market, neighbours, suppliers).
		• Contrast with certified seed:
		  ○ Advantage: reliable, disease-free, true-to-type.
		  ○ Disadvantage: often more expensive, not always available.	

3.4 Seed pre-treatment	48 min	Explain why seed pre-treatment is needed, and the basic ways that different types of seeds can be pre-treated.
		Use the activity below to demonstrate that different seeds need different pre-treatment methods to improve germination and reduce losses.
		
		Activity 13: Demonstration: Concept of Seed Pre-treatment
		
		Materials needed:
		• Three simple demonstration items:
		  ○ **Water soaking:** A cup of beans or maize seed (or any locally available seed): half dry; half soaked in water for a few hours.
		  ○ **Chemical treatment:** mango seeds, water and food colouring
		  ○ **Steam treatment:** A pan with a lid and some water (to show how steaming works); avocado seed; heat source
		Steps:
		1. **Trainer Demonstration**
			Cup of beans or maize seeds; bowl; water
			
			Mango seeds and food colouring; bowl, water.
			
			Pot with lid; steaming basket to fit inside pot

Topic	Time	Training Instructions	Resources

		• Show untreated seeds (dry beans or maize).
		• Show treated seeds (soaked beans or maize).
		• Explain: *Pre-treatment helps seeds germinate faster, more evenly, and with less disease.*
		• Demonstrate:
		  ○ Add food colouring to water and place 2 – 3 mango seeds in this solution for 10 – 15 minutes, then take them out and compare the colour to unsoaked sees. The colour is a placebo for the chemical – learners can see how it is absorbed and therefore helps to prevent disease.
		  ○ Show how to steam seeds using the pot
		2. **Discussion of Methods**
		• **Water soaking:** softens seed coat, helps faster germination.
		• **Chemical treatment:** protects against fungi, insects, disease
		• **Steam treatment:** kills disease organisms on seed surface.
		• Reinforce that the right method depends on the fruit type.
		3. **Quick Question Round**
		• Ask: *Why don't all seeds need the same treatment?*
		• Guide learners to understand that seed hardness, pulp, and disease risks differ by fruit.	

3.5 Sowing	42 min	Explain the concept and basic principles of sowing seeds, then deliver the activity so that learners understand the basic principles of sowing, compare	Seeds

Topic	Time	Training Instructions	Resources
		direct vs indirect methods, and practise sowing in both containers and seedbeds. **Activity 14: Demonstration and Practice: Sowing seeds** **Materials needed:** • Samples of **different seed sizes** (e.g. large = beans/avocado pits; small = tomato, amaranth, papaya). • Containers : poly tubes, pots, or tins. • A small seedbed prepared outside (or a box/tray filled with media if indoors). • Simple tools: dibber/stick, trowels, watering can. • Nursery media (soil mix). • Labels and record sheet. **Steps:** 1. **Trainer Demonstration: General Principles** • Show a **large seed** and a **small seed**. Ask: *Should both be planted the same way?* • Demonstrate: ○ **Container size**: larger seeds → bigger containers; small seeds → smaller containers or trays.	Containers Media/soil mix Potting tools Labels and record sheets found in Activity Resource section

Topic	Time	Training Instructions	Resources
		○ **Planting depth**: rule of thumb = 2–3 times the seed's size. ○ **Orientation**: flat or upright for large seeds (not upside down); less important for tiny seeds. ○ **Holes**: make proper holes to avoid crushing the seed. 2. **Direct vs Indirect Sowing Demo** • **Direct:** Show sowing one large seed (bean, mango pit substitute) into a polytube. Cover lightly. • **Indirect:** Show how to broadcast many small seeds (like tomato or mustard) in a shallow seedbed/tray, then cover with fine soil or sawdust. 3. **Group Practice** • Divide learners into small groups. • Give each group two tasks: ○ Sow a few large seeds directly into polybags. ○ Broadcast small seeds into a tray/seedbed. ○ Ask each group to **label** their containers/tray with date and seed type. 4. **Discussion** • After the exercise, ask: *What was easy? What was difficult?* • Compare the **pros and cons**: ○ Direct = less transplant shock, stronger roots, but uses more space. ○ Indirect = saves space, easier for tiny seeds, but requires transplanting.	

Topic	Time	Training Instructions	Resources
		5. **Recordkeeping Practice** • Learners enter in a simple logbook: date, seed type, number of containers/trays sown.	
3.6 Mulching	36 min	Explain the concept and benefits of mulching, then run the activity so that learners understand the purpose of mulching, different mulch materials, and when to apply mulch in a nursery. **Activity 15: Demonstration and Practice: Mulching** **1. Trainer Demonstration** • Show one uncovered seedbed and one mulched with dry grass. • Water both and ask learners to observe: o Water on uncovered soil runs off or splashes. o Water on mulched soil soaks in gently and keeps soil moist. • Explain functions of mulch: o Keeps moisture in soil. o Protects seedlings from heavy rain, sun, or weeds. o Reduces soil temperature extremes. **2. Group Practice** • Divide learners into small groups.	Seedbeds – 1 mulched, 1 not mulched Dry grass Watering can with water Plastic mulching sheet

Topic	Time	Training Instructions	Resources

		• Each group applies mulch to a small part of a bed or tray using dry grass.
		• Show plastic sheeting as another option, but explain it is less common and can heat soil too much if not used carefully.
		3. Discussion
		• Ask: *When should mulch be applied?*
		  ○ After sowing seeds (light cover to protect).
		  ○ After transplanting seedlings (to reduce stress).
		• Ask learners which materials are available locally for mulching.	

3.7 Transplanting	36 min	Discuss that seeds sowed in seed beds or trays need to be transplanted into bigger containers. Run the following activity so that learners practise transplanting seedlings from seedbeds into polytubes/polybags under the right conditions, using correct handling techniques. **Activity 16: Demonstration and Practice: Transplanting Seedlings** **Materials needed:** • A seedbed or germination tray with small seedlings. • Empty polytubes filled with prepared media. • Small tools: dibbers/sticks, trowels, watering can. • Shade area for placing newly transplanted seedlings.	Seedbed or germination tray with small seedlings Empty polytube/bags with prepared media Tools: dibbers, trowel, watering can Shaded area for working and placing transplanted seedlings

Topic	Time	Training Instructions	Resources
		Steps: 1. **Trainer Demonstration** • Show seedlings in the seedbed. Point out the right stage for transplanting: **3–5 cm tall with at least 4 true leaves.** • Demonstrate step by step: 1. Water the seedbed lightly before starting (softens soil). 2. Use a dibber or trowel to gently lift seedlings, keeping soil around roots. 3. Trim very long roots slightly to encourage straight downward growth. 4. Make a small hole in the polybag with a dibber. 5. Place the seedling carefully, keep it upright, cover with soil, and press gently around the base. 6. Water lightly after transplanting. • Explain: transplant during **cool times** (early morning or evening) and keep seedlings in shade for 2–3 days to reduce stress. 2. **Learner Practice** • Divide learners into small groups. • Each group transplants a set of seedlings from a seedbed into polybags. • Trainer supervises, correcting handling mistakes (e.g. pulling seedlings roughly, planting too deep/shallow). 3. **Discussion**	

Topic	Time	Training Instructions	Resources
		• Ask learners: *What happens if seedlings are transplanted too early or too late?* • Reinforce: seedlings must be strong enough (true leaves) but not too big (to avoid root damage). • Discuss why watering before and after transplanting reduces stress.	

Module 4: Nursery Operations

Topic	Time	Training Instructions	Resources
4.1 Watering/irrigation	2 min	**Water sources**: explain the potential sources of water, and how nursery needs to know which one to use. **Activity 17: Water Source Mapping** 1. Draw a simple map of a community on the board with a borehole, river, tap, and dam. 2. Ask learners: *If your nursery is here (point to a spot), which water source would you use? Why?* 3. Discuss pros and cons (distance, cost, reliability, water quality).	Flipchart and markers, or board and chalk
	2 min	**Types of irrigation/watering**: explain that a nursery can use various methods of watering for seedbeds and seedlings, and demonstrate them in the next activity, in the nursery. **Activity 18: Demonstration of Watering Methods** 1. Bring three simple items: a watering can, a hosepipe, and a small bottle with holes punched in the cap (to represent sprinklers).	Watering can, hosepipe, small bottle with holes in the cap, water, seedbeds/seed tray

Topic	Time	Training Instructions	Resources
		2. Demonstrate watering a small tray of soil/seedlings with each method. 3. Ask: *Which is easiest? Which wastes more water? Which is best for a big nursery vs a small one?*	
	3 min	**Water quality:** discuss the importance of water quality when sourcing and using water in a fruit tree seedling nursery. Use the following activity to demonstrate how to physically observe water quality: **Activity 19: Water Quality Test: Simple Observation** 1. Fill three jars with: • Clean clear water • Murky water with soil/sand • Smelly or coloured water (e.g. add leaves/organic matter/manure). 2. Ask learners to observe colour, smell, and clarity. 3. Discuss why clear, clean water is needed for healthy seedlings. 4. Explain that real water testing (pH, contamination) is possible, but observation is the first step.	3 glass jars; water, soil/sand; leaves. organic matter or manure
	2 min	**Time of watering:** explain the best time for watering seedlings, and reasons for this. Demonstrate with the following activity.	Flipchart and markers

Topic	Time	Training Instructions	Resources
		Activity 20: Sun and Shadow demonstration (optional) 1. Draw a simple picture of the sun overhead (midday) and one of the sun low (morning/evening). 2. Ask: *At which time is it better to water seedlings? Why?* 3. Learners answer: early morning or late afternoon (less evaporation, less stress).	
	3 min	**Frequency of watering:** discuss how often seedings should be watered, and the factors to consider when planning the frequency – e.g. season, rain, seedling size. Use the following fun demonstration to illustrate the point. **Activity 21: Frequency of Watering (optional)** 1. Assign three learners' roles as seedlings: small, medium, large. Without embarrassing anyone, select 3 learners of different heights – one short, one medium and one tall – and have them stand in front of the group. 2. Ask the class: *Should they all get the same amount of water?* 3. Guide discussion: smaller seedlings need less water, big seedlings need more, and frequency depends on season and daily observation.	

Topic	Time	Training Instructions	Resources
4.2 Fertilising	20 min	**Nutrition concept**: Explain the need for nutrients for all living things and how this relates to plants. **Activity 22: Illustration of Macro and Micro-nutrients** 1. Ask learners what they typically eat at one meal 2. From their answers, draw a plate of traditional food on the board/flipchart. Use colours for different items. Make sure to draw in a starch (e.g. ugali or rice), a protein (e.g. meat, chicken or fish) and side/veg dishes and condiments (e.g. chili). 3. Explain that for people, we need to eat a variety of foods in a meal, in different quantities, to get the nutrition we need for energy and for general health. 4. Explain that some nutrients are needed in large quantities – like the starch that forms a big part of the plate, and others are needed in smaller quantities – like the side dishes. 5. Explain the concept of macro and micro-nutrients, and how this relates to plant nutrition. 6. Using another colour, write NPK on the starch and meat to indicate these are the equivalent of macronutrients for plants. Indicate the rest are micro-nutrients and explain what these are and what they do. 7. Give a short lesson on what each of the macro and micro-nutrients contribute to plants, and what happens if plants do not get these nutrients (deficiency diseases and symptoms).	Flipchart and markers

Topic	Time	Training Instructions	Resources
	19 min	**Fertilisers**: explain what fertilizers are and the types of fertilizers: organic and inorganic. **Activity 23: Show and Tell: Organic vs Inorganic Fertiliser** 1. Bring samples of chicken manure or compost (organic) and a small bag of NPK or Urea (inorganic). 2. Present them all at a main table so they can be seen by everyone in the group. 3. Explain each one and pass them around so learners can see and smell the difference. 4. Ask: *Which one is cheaper? Which one is faster acting? Which one lasts longer in the soil?* 5. Summarise: organics = slow release, improve soil; inorganics = quick action, more precise.	Samples of organic and inorganic fertilisers: manure, compost, NPK, Urea
	19 min	Fertiliser application: explain that there are different ways to apply fertilisers to plants/ seedlings, and the principles and pros and cons of each. Demonstrate this with the following activity. **Activity 24: Demonstration: Fertiliser Application**	Small sample of granular fertiliser Water sprayer Sample of manure and compost

Topic	Time	Training Instructions	Resources
		1. In the nursery, show **granular application**: sprinkle a tiny, measured amount of fertiliser on the soil around a seedling (avoid touching stem/roots). 2. Show **foliar application**: spray water onto a leaf with a hand sprayer (use plain water in training to demonstrate). 3. Demonstrate how to use organic fertiliser (manure and compost). 4. Discuss advantages and risks of each.	
	19 min	**Timing and dosage**: discuss when to apply fertiliser, and how much to apply. **Activity 25: Application Exercise** 1. On the board, write three examples – do not add the writing in brackets – just the fertiliser name): • Chicken manure (→ before watering) • Urea (→ after watering). • NPK (→ after watering). 2. For each of the examples, ask learners when the fertiliser should be applied in relation to watering the seedlings. The answers are in the brackets next to each example above. 3. Show how overuse can "burn" seedlings (draw a seedling wilting with too much fertiliser).	Flipchart and markers

Topic	Time	Training Instructions	Resources
	19 min	**Activity 26: Observation Practice** 1. Give learners pictures (or simple drawings) of seedlings showing nutrient deficiency (yellow leaves = lack of N, purple/weak roots = lack of P, leaf edge burn = lack of K). 2. Ask: *What nutrient is missing?* 3. Emphasise: fertilising frequency should be based on daily scouting and the schedule (e.g. 2.5 g per plant after 21 days, then every 4 weeks).	Pictures or drawings of seedlings with nutrition deficiencies – or actual samples from a nursery
4.3 Pest Control	32 min	Present a lesson on pests and pest control. Include the following activities to give practical application to the content. **Activity 27: Pests: Show and Tell** 1. Bring simple pictures or real examples (e.g. aphids on leaves, chewed leaves from caterpillars, rodents). 2. Ask learners: *What do you see? Is this good for seedlings or bad? Why?* 3. Define pests simply: *any animal or insect that damages seedlings.* 4. Show seedlings (or pictures) with pest damage: holes in leaves, yellow leaves, wilted seedlings, chewed stems. 5. Ask learners to describe the damage and link it to pest attack.	Pictures or samples of evidence of pests, or pests themselves e.g. aphids.

Topic	Time	Training Instructions	Resources
		6. Discuss: *What happens if pests are not controlled?* (stunted seedlings, losses, weak plants)	
	32 min	**Activity 28: Types of Pests** 1. Prepare cards with pictures of different pests: insects (aphids, caterpillars, leaf miners), rodents (rats, mice), nematodes (root knots). 2. Learners sort them into categories: **Insects, Rodents, Nematodes.** 3. Trainer explains how each causes damage (chewing leaves, sucking sap, damaging roots). 4. How pests spread: On the board, write: *Flying, Soil, Contaminated tools, Carried by people.* 5. Ask learners for examples (aphids = flying, nematodes = soil, dirty pruning knife = equipment).	Make cards or printout from the content supplied in the activity resources section.
	32 min	**Activity 29: Demonstration: Prevention and Control** 1. Demonstrate different methods: • **Sanitation** – show cleaning tools. • **Physical removal** – pick off a caterpillar (use a stone or object to represent it). • **Traps** – show a sticky card for flying insects or a rat trap.	Traps, sprayer, PPE (gloves, masks)

Topic	Time	Training Instructions	Resources
		• **Spraying/Drenching** – demonstrate using a hand sprayer (with water). • **Biological control** – explain with example (ladybirds eat aphids). 2. Emphasise **safety**: always use gloves, masks, avoid spraying in wind, and wash after handling chemicals. 3. Give learners scenario cards: e.g. "*Leaves have small holes*" or "*Roots have knots*" or "*Mice eating seedlings.*" 4. Groups decide: What type of pest? What control method would you use? 5. Groups present their answers.	
4.4 Disease Control	96 min	Present a lesson on diseases that affect fruit tree seedlings. Include what 'disease' is, effects of diseases, types of diseases, methods of contamination, means of prevention and control, as well as safety in the control of diseases. Use digital or printed images, or real samples of plants to show the different types of diseases. **Activity 30: Demonstration and Practical** 1. Take learners into the nursery and look for any signs of disease. 2. If found, ask learners to identify what the disease is, and to explain how it spreads, and how to prevent and control it. 3. Even if there are no diseased plants, demonstrate the tools and equipment and methods of dealing with diseased plants.	Disease control materials, equipment and PPE

Topic	Time	Training Instructions	Resources
4.5 Weeding	132 min	**Activity 31: Weed Show and Tell** 1. Collect samples of common weeds from the local area. 2. Place them next to young seedlings. 3. Ask learners: *Which plant is the seedling? Which is the weed?* 4. Define weeds simply: *plants that grow where they are not wanted and compete with seedlings.* 5. Identify and explain the different common types of weeds using the samples you have. 6. Ask and discuss why weeds need to be controlled (they compete with plants). 7. Demonstrate weed control methods. 8. Learners practice by weeding sections of the nursery under supervision of the trainer.	Samples of common weeds Weeding tools
4.6 Thinning	72 min	Explain the concept of thinning and why it is done. **Activity 32: Demo and Practice: Thinning Seedlings** **Materials needed:** • Polytubes or pots sown with 3–4 seeds each (can also use fast-germinating vegetables like beans or maize for demonstration).	Polytubes with seedlings Small scissors Watering can

Topic	Time	Training Instructions	Resources
		• Small knives/scissors for cutting weak seedlings. • Watering can. **Steps:** 1. **Trainer Demonstration** o Show a polytube where 3 seedlings have sprouted. o Point out the differences: one is tall and strong, the others are smaller or weaker. o Explain: *Thinning means removing weaker seedlings so the strong one can grow well.* o Demonstrate removing weaker seedlings by gently pulling them out or cutting at soil level. o Water lightly after thinning to reduce stress. o Show where to dispose of the removed seedlings – e.g. composting. 2. **Learner Practice** o Give each learner or group a pot/polytube with multiple seedlings. o Ask them to choose the strongest seedling and remove the weaker ones. o Trainer checks technique (gentle handling, not damaging roots of the main seedling). 3. **Discussion** o Ask: *Why do we thin?* → To reduce competition for nutrients, water, and space.	

Topic	Time	Training Instructions	Resources
		○ Ask: *When do we thin?* → About 1–2 months after germination, when seedlings are big enough to identify the strongest.	
4.7 Pruning	72 min	Explain the concept of pruning and why it is conducted. Explain why both roots and shoots are pruned. **Activity 33: Demonstration and Practice: Pruning Roots and Shoots** **Materials needed:** • A few seedlings in polytubes. • Small scissors/secateurs or knives. • Flipchart with two drawings: roots growing out of polybags, shoots growing below a graft. **Steps:** 1. **Trainer Demonstration – Roots** ○ Show a seedling with roots coming out of the bottom of a polybag. ○ Explain: *Pruning roots stops seedlings from becoming root-bound and encourages straight downward growth.* ○ Demonstrate trimming the roots lightly during transplanting or cutting roots growing into the ground from open tubes.	Polytubes with seedlings Small scissors Watering can

Topic	Time	Training Instructions	Resources
		○ Explain also that rootstock roots are pruned when preparing for grafting/budding. 2. **Trainer Demonstration – Shoots** ○ Show a grafted seedling with shoots growing from the rootstock below the graft union. ○ Explain: *Pruning shoots below the graft ensures the scion grows strong without competition.* ○ Demonstrate cutting off the unwanted shoots cleanly with scissors. 3. **Learner Practice** ○ Divide learners into pairs or groups. ○ Each group practises trimming roots (on demo seedlings or practice plants) and removing unwanted shoots. ○ Trainer checks that cuts are clean, and learners understand *why* they are pruning. 4. **Discussion** ○ **Ask**: *What happens if we do not prune roots?* (seedlings become weak, root-bound, or stunted). ○ **Ask**: *What happens if we do not prune shoots below the graft?* (scion growth is weak, poor fruit quality). ○ Reinforce guidelines: prune only, when necessary, use clean tools, make neat cuts.	

Topic	Time	Training Instructions	Resources
4.8 Nursery scouting	72 min	Present a lesson, with the following activity, to explain the importance of daily inspection (scouting) and practise checking seedlings, equipment, and records using a simple checklist. **Activity 34: Daily Nursery Inspection: Scouting** **Materials needed:** • A small nursery area (real or mock-up with trays/polytubes). • Seedlings (healthy + some showing problems like dryness, pests, yellowing). • Tools and equipment (watering can, sprayer, hoe). • Bags of fertiliser or manure (empty or small samples). • A simple **scouting checklist** (printed or drawn on board). **Steps:** 1. **Trainer Explanation** o Explain: *Nursery scouting means walking through the nursery every day to check for problems early.* o List what to observe: moisture, pests/diseases, fertiliser needs, growth, drainage, stock, equipment. 2. **Demonstration** o Walk learners through the nursery area.	Scouting checklist in the Training Resources section

Topic	Time	Training Instructions	Resources
		○ Show examples: ▪ Dry soil = needs water. ▪ Seedling with yellow leaves = maybe nutrient deficiency. ▪ Holes in leaves = pest attack. ▪ Blocked drainage channel = poor water flow. ▪ Broken watering can = equipment problem. ○ Tick these items on the checklist while demonstrating. 3. **Learner Practice** ○ Divide learners into small groups. ○ Each group inspects part of the nursery and fills in their own checklist. ○ Groups report findings: what they saw and what action is needed. 4. **Discussion** ○ Trainer asks: *Why is daily scouting important?* ○ Learners answer: it helps catch problems early, prevents losses, and keeps the nursery organised.	
4.9 Common mistakes in nursery operations	12 min	Explain that common errors in a nursery will affect fruit seedling production. Use the following activity to demonstrate the difference between common mistakes and good practice. **Activity 35: Flashcard Activity: Mistakes vs Good Practice**	

Topic	Time	Training Instructions	Resources
		1. Make/print cards with the following content, one per card: • Container half-filled with soil. • Container leaning, not upright. • Seed sown too deep. • Soil in seedbed reused without change. • Seedling pulled roughly from the soil. • Roots exposed to air after lifting. • Transplanting delayed for too long. • Air space left around roots in container. • Roots pruned too harshly. • Roots not pruned before transporting to the field. • Container filled firmly, no air gaps. • Container upright and stable. • Seed sown at correct shallow depth. • Fresh soil/media used for each production cycle. • Seedling lifted gently with soil around roots. • Roots kept covered during transplanting. • Seedlings transplanted at the right time. • Roots well-fitted in soil, no empty spaces. • Roots pruned carefully to encourage downward growth. • Seedlings checked and pruned before transport to the field.	Cards found in the Training Resources section

Topic	Time	Training Instructions	Resources
		2. Hand the cards out randomly to the learners. 3. Tell them to read their cards and those with a good practice must stand on one side, and those with a mistake, must stand on the other side. 4. One they have done this, facilitate a process where you check with the class if each one is correct and on the right side. 5. Discuss each mistake and what the results of such a mistake will be.	

Module 5: Propagation

Topic	Time	Training Instructions	Resources
5.1 Introduction	12 min	Present an introductory lesson about propagation of fruit trees. Introduce the topic by asking learners how new fruit trees are usually produced (from seed, cuttings, grafting). Lead them to the idea that nurseries often use **vegetative propagation** because it has special benefits. Write the three subtopics on the board/flipchart: • Reasons and benefits. • Types: grafting and budding. • Principles: sanitation, use of healthy materials. Guide a short class discussion under each point, linking to learners' experiences. Keep it brief and tell them they will see and practise the actual techniques later in the module.	
5.2 Prepare rootstock	72 min	Explain why and how to prepare rootstocks for propagation, using the following activity. **Activity 36: Demonstration & Practice – Preparing Rootstock**	Different rootstock seedlings of varying size and health

Topic	Time	Training Instructions	Resources
		1. **Trainer demonstration:** ○ Show different rootstock seedlings of varying size and health. ○ Point out which ones are best for grafting/budding (pencil-thick stem, healthy leaves, upright growth). ○ Demonstrate how to move selected rootstock to the propagation area and explain the importance of letting them rest for 2–3 days. ○ Show correct watering of rootstock during this resting period. 2. **Learner practice:** ○ In groups, learners sort a batch of rootstock seedlings, separating healthy, suitable ones from weak or unsuitable ones. ○ Practise moving and arranging them in the propagation area. ○ Trainer checks and guides groups to ensure correct selection and handling. 3. **Discussion:** ○ Ask learners: *Why do we sort rootstock seedlings before grafting?* ○ Reinforce: only strong, uniform rootstock ensures successful grafting and healthy seedlings for sale.	
5.3 Budding	102 min	Explain that budding is the main propagation method for **oranges and other citrus**. Highlight that the choice of budwood determines the variety and fruit quality.	Sharp budding knives Budding tape, Disinfectant

Topic	Time	Training Instructions	Resources
		Activity 37: Demonstration & Practice – Budding Citrus Seedlings 1. **Trainer demonstration:** ○ Show how to identify a suitable budwood source (healthy, disease-free, correct variety). ○ Explain possible sources of buds: from plantations, dealers, or by paying someone to harvest in an orchard. ○ Display the tools and materials required (sharp budding knife, budding tape, disinfectant). ○ Demonstrate the two common methods: ▪ **T-budding** – making a T-shaped cut in the rootstock and inserting the bud shield. ▪ **Chip budding** – more common in Morogoro; cutting a small chip from the rootstock and replacing it with a matching bud chip. ○ Show how to tie and protect the bud with budding tape. 2. **Learner practice:** ○ Learners work in pairs to practise both budding methods using sample rootstock. ○ Trainer checks for clean cuts, proper alignment, and safe knife use. 3. **Discussion:** ○ Ask: *Why is it important to use only healthy, disease-free buds?*	Seedlings (rootstocks) Budwood Budding tape

Topic	Time	Training Instructions	Resources
		○ Reinforce: the bud controls the variety, while the rootstock provides strength. ○ Remind learners: after budding, seedlings must be **watered more frequently for at least 3 weeks** to support healing and growth.	
5.4 Grafting	102 min	Explain that grafting is widely used for crops like **avocado and mango**. Remind learners that grafting joins a scion (from a good mother tree) to a rootstock (strong, healthy seedling). **Activity 38: Demonstration & Practice – Grafting Fruit Seedlings** 1. **Trainer demonstration:** ○ Show a prepared rootstock seedling (pencil-thick, healthy). ○ Show a scion from a healthy, disease-free mother tree. ○ Demonstrate the most common technique: ▪ **Cleft grafting** – cut the rootstock stem, make a slit, insert a wedge-shaped scion, and tie firmly with grafting tape. ○ Emphasise sanitation: disinfect tools before use. ○ Explain aftercare: shade, watering, and checking graft success (green bud growth, healed union). 2. **Learner practice:**	Rootstock seedlings Sharp grafting knives Grafting tape

Topic	Time	Training Instructions	Resources
		○ Learners practise making grafts in pairs using sample seedlings and scions. ○ Trainer circulates, checking for correct cuts, firm unions, and safe knife handling. 3. **Discussion:** ○ Ask: *What are the main benefits of grafting compared to seed propagation?* ▪ Earlier **fruiting**, true-to-type seedlings, higher market value. ○ Ask: *What happens if scions are taken from diseased trees?* (disease spreads, seedlings fail). 4. **Key reminder:** ○ Grafting success depends on **healthy materials, clean tools, and careful aftercare**.	
5.5 Hardening off	72 min	Explain that **hardening off** is the process of gradually preparing seedlings to survive outside the nursery. Emphasise that it reduces transplant shock and increases field survival. **Activity 39: Demonstration & Discussion – Hardening Off Seedlings** 1. **Trainer demonstration:** ○ Show seedlings still in shaded nursery conditions.	Seedlings Watering can

Topic	Time	Training Instructions	Resources
		○ Demonstrate how to reduce shade gradually over 1–2 weeks. ○ Show reducing watering frequency, so seedlings adjust to less frequent moisture. ○ Point out signs that seedlings are ready: stronger stems, firm leaves, and ability to withstand direct sunlight. 2. **Learner practice/observation:** ○ Learners observe different batches of seedlings (some still soft, some hardened off). ○ In groups, they discuss which are ready for transplanting and why. 3. **Discussion:** ○ Ask: *What happens if seedlings are transplanted without hardening off?* ▪ Wilting, high mortality, farmer complaints. ○ Ask: *Why is hardening important for nursery reputation?* 4. **Key reminder:** ○ Hardening off is done **before sale or transplanting** and involves reducing shade and water to toughen seedlings.	

Module 6: Nursery Management

Topic	Time	Training Instructions	Resources
6.1 Good nursery practices	72 min	**Activity 40: Group Brainstorm & Walk-Through** 1. **Brainstorm (classroom):** o Ask learners: What makes a nursery "good"? o Write answers on the flipchart. Guide them toward the key points: ▪ Clear walkways ▪ Hygiene and sanitation ▪ Good tools and equipment care ▪ Safe and comfortable working methods (ergonomics) ▪ Recordkeeping ▪ Use of PPE ▪ Planning and scheduling ▪ Money management o Explain each one of these points in detail and why it is important. o Show PPE items and demonstrate how they are worn and used. 2. **Nursery walk-through (or picture observation if no nursery available):** o Take learners to a real nursery OR show photos/sketches of nursery scenes (some good, some poor).	Nursery or photos of nursery practices – good and bad. Examples of PPE: gloves, masks

Topic	Time	Training Instructions	Resources
		○ In groups, ask them to identify *good practices* and *bad practices*. 3. **Group feedback:** ○ Each group shares one good and one poor practice they observed. ○ Discuss why following good practices helps the nursery run better, keeps workers safe, and builds customer trust. 4. **Trainer summary:** ○ Reinforce that good practices are not just about plants, but also about **organisation, safety, and reputation**.	
6.2 Nursery calendar	72 min	**Activity 41: Calendar Planning Exercise** 1. **Trainer introduction:** ○ Explain that a nursery calendar helps ensure seedlings are ready at the correct time for planting out in the field. ○ Emphasise the principle: always *work backwards* from the expected planting season. 2. **Demonstration:** ○ Draw a simple 12-month calendar on the board or flipchart. ○ Mark the **planting season** (e.g., start of rains). ○ Work backwards with the class to add key activities: seed collection, soil preparation, sowing, transplanting, hardening off, marketing. 3. **Learner practice:**	Example of nursey calendar in Training Resources section

Topic	Time	Training Instructions	Resources
		○ In groups, learners create their own sample nursery calendars for one fruit tree (e.g., mango). ○ Each group presents when they would sow, transplant, and prepare seedlings so they are ready for the rains. 4. **Discussion:** ○ Trainer asks: *What happens if the nursery calendar is not followed?* (seedlings not ready on time, poor sales, farmer dissatisfaction). 5. **Key takeaway:** ○ A nursery calendar ensures that inputs, labour, and seedlings are all organised on time for successful sales and planting.	
6.3 Planning and Scheduling	72 min	Explain that planning and scheduling help nurseries organise work step by step so seedlings are ready on time. Stress that planning is always based on the **nursery calendar**. **Activity 42: Group Work – Turning the Nursery Calendar into a Schedule** 1. **Trainer demonstration:** ○ Show an example on the board: ▪ *Calendar says, "sowing in November."* ▪ Weekly schedule: Week 1 – collect and prepare soil; Week 2 – buy polybags; Week 3 – sow seeds.	

Topic	Time	Training Instructions	Resources
		○ Point out the **benefits** saves time, avoids confusion, links work to budget. 2. **Learner practice:** ○ In groups, learners choose one activity from the nursery calendar (e.g., transplanting, fertilising, hardening off). ○ They break it into a **weekly or monthly schedule**, writing what to do, when, and what resources are needed. ○ Trainer moves around, guiding where needed. 3. **Discussion:** ○ Groups present their schedules. ○ Trainer asks: *What happens if weather or other problems cause delays?* ○ Emphasise adjusting the schedule: corrective actions and contingency plans (e.g., extra watering during drought). 4. **Key takeaway:** ○ Planning and scheduling make sure nursery tasks are **timely, budgeted, and flexible** to adapt to challenges.	
6.4 Labour needs	72 min	Explain that nurseries need different kinds of labour at different times. Some tasks require **skilled workers** (like grafting), others only **extra hands** (like filling polybags). **Activity 43: Group Discussion & Planning – Labour in the Nursery**	Sample nursery schedule, Markers and flipchart

Topic	Time	Training Instructions	Resources
		1. **Trainer demonstration:** o Show a sample nursery schedule (from the previous exercise). o Highlight points where extra help is needed (e.g., sowing, transplanting, grafting, hardening off, marketing). o Explain that labour can come from **family, friends, or hired workers**. 2. **Learner practice:** o In groups, learners review one sample nursery schedule. o They mark where extra labour is needed and decide: ▪ Is it skilled or unskilled labour? ▪ Where will they find it (family, neighbours, hired)? ▪ How will they budget for it? 3. **Discussion:** o Groups present their ideas. o Trainer asks: *What happens if labour is not planned in advance?* (delays, poor-quality work, seedlings not ready for sale). 4. **Key takeaway:** o Labour planning ensures the nursery has **enough hands at the right time**, within budget, and without disrupting operations.	
6.5 Inventory control	72 min	Explain that a nursery must always know what materials it has, what has been used, and what needs to be bought.	Sample inventory items:

Topic	Time	Training Instructions	Resources
		Poor inventory control leads to waste, shortages, or expired products. **Activity 44: Demonstration & Practice – Keeping Track of Nursery Stock** 1. **Trainer demonstration:** ○ Show examples of inventory items: a bag of fertiliser, a pesticide container, hand tools, trays, and seedlings. ○ Present a simple stock card or logbook with columns: *Item – Quantity In – Quantity Out – Balance – Date*. ○ Demonstrate an entry: "NPK fertiliser, 50 kg received, 10 kg used, balance 40 kg." 2. **Learner practice:** ○ In groups, learners receive a mock list of materials (fertiliser, pesticide, tools, seedlings). ○ They practise recording movements in and out of stock on a sample inventory sheet. 3. **Discussion:** ○ Trainer asks: *What happens if a nursery runs out of inputs at a critical time?* ○ Emphasise that keeping proper records prevents shortages, avoids overbuying, and helps manage costs. 4. **Key takeaway:**	• Bag of fertiliser (e.g. NPK) • Pesticide container (empty or safe sample) • Hand tools (hoe, trowel, watering can) • Nursery trays/pots • Seedlings in bags or trays Sample stock card or logbook

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<tr><th>Topic</th><th>Time</th><th>Training Instructions</th><th>Resources</th></tr>
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Inventory control ensures that fertilisers, pesticides, equipment, and plant stock are always available when needed, supporting smooth nursery operations.
</td><td></td></tr>
<tr><td>6.6 Money management</td><td>90 min</td><td>
Explain that good money management helps nurseries know if they are making a profit or loss.
Stress that both expenditure (costs) and income must be recorded clearly.

Activity 45: Group Exercise – Tracking Costs and Income

1. Trainer demonstration:

Draw a simple cash record with two columns: Expenditure (fertiliser, polybags, labour, water, tools) and Income (seedling sales).
Give an example: “Spent 50,000 TZS on polybags; sold 200 seedlings at 1,000 TZS each = 200,000 TZS income.”
Demonstrate calculating profit: Income – Expenditure = Profit.
Use the following template for demonstrating these simple principles

<table>
<tr><th>Date</th><th>Income</th><th>Amount</th><th>Date</th><th>Expense</th><th>Amount</th></tr>
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</td><td>Realistic figures for costs and income</td></tr>
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Topic	Time	Training Instructions	Resources

	Total Income			**Total Expenses**	
	Less total expenses				
	Profit/Loss				

- Prepare some additional 'income' and 'expenses' (realistic figures) for the learner practice activity.

2. **Learner practice:**
   - In groups, learners receive a short scenario with sample nursery costs and sales.
   - They list expenses, record income, and calculate profit or loss.
   - Groups also suggest how to set a selling price (considering seedling size, type, cost of production, and market demand).
3. **Discussion:**
   - Groups present results. Trainer asks: *Why is knowing profit or loss important for a nursery?*

Topic	Time	Training Instructions	Resources
		○ Reinforce that good records help in making decisions about pricing, scaling up, or cutting unnecessary costs. 4. **Key takeaway:** ○ Money management ensures nurseries keep track of **spending, income, and profits**, allowing them to set fair prices and sustain the business.	
6.7 Recordkeeping	90 min	Explain that recordkeeping helps nurseries track daily work, inputs, and sales. Without records, it is impossible to know costs, seedling numbers, or when to take action. **Activity 46: Demonstration & Practice – Using Nursery Records** 1. **Trainer demonstration:** ○ Hand out copies from the Training Resources – each one has an explanation and an example of the data that should be filled in. ○ Show and explain how to fill in the examples of the simple record sheets (potting, sowing, pest and disease control, inventory, scouting, finance, sales). ○ Explain that they can keep these records in simple school-style exercise books they can buy at any stationer. ○ Fill in one example on the board: ▪ *Sowing record:* Date – Mango – 200 seeds sown – Bed A. ▪ *Sales record:* Date – 50 avocado seedlings – sold at 1,500 TZS each.	Examples of records in Training Resources section

Topic	Time	Training Instructions	Resources
		2. **Learner practice:** ○ In groups, learners receive a short scenario (e.g., "Today the nursery sowed 300 papaya seeds, used 10 kg compost, sold 20 orange seedlings"). ○ Each group fills in the correct records for sowing, inventory, and sales. 3. **Discussion:** ○ Groups share their entries. ○ Trainer asks: *What happens if records are not kept?* (waste, lost money, poor planning). 4. **Key takeaway:** ○ Accurate records for **potting, sowing, pest and disease control, inventory, scouting, finances, and sales** ensure smooth nursery management and profitability.	

Module 7: Marketing and Sales

Topic	Time	Training Instructions	Resources
7.1 Markets and buyers	12 min	Explain that a nursery must know its **markets** (what fruit and varieties are in demand) and its **buyers** (who will purchase the seedlings). **Activity 47: Brainstorm & Role Play – Who Buys Our Seedlings?** 1. **Brainstorm:** o Ask learners: *Who are the possible buyers of seedlings in your area?* o Write responses on the board (farmers, other nurseries, domestic gardeners, schools, NGOs, commercial farms). o Add which fruit varieties are most demanded by each type of buyer. 2. **Role play:** o Divide learners into two groups: *sellers* (nursery operators) and *buyers* (farmers, hotels, NGOs, domestic customers). o Each "seller" group prepares a short sales pitch for their seedlings. o Each "buyer" group asks questions (about price, variety, quality). 3. **Discussion:** o Trainer asks: *What did you notice about different buyers' needs?* o Reinforce that knowing the market and buyers helps the nursery produce the right seedlings and sell them at the right time.	Flipchart and markers

Topic	Time	Training Instructions	Resources
		4. **Key takeaway:** ○ Understanding **market demand** and **buyer types** ensures seedlings are grown to meet real needs, increasing sales and profitability.	
7.2 Marketing activities	90 min	Explain that nurseries, like any business, need to promote themselves so customers know what they sell. Even simple, low-cost marketing tools can make a big difference. **Activity 48: Group Work – Designing Simple Marketing Materials** 1. **Trainer demonstration:** ○ Show examples (real or printed) of: ▪ A nursery **business name and logo**. ▪ **Signboard** placed outside a nursery. ▪ **Business card** with contact details. ▪ **Social media posts** (WhatsApp, Facebook, Instagram, TikTok). 2. **Learner practice:** ○ In small groups, learners design one simple marketing tool, or each group can design a whole set of tools for a business that they create: ▪ Group A: Create a name and logo. ▪ Group B: Sketch a signboard.	Examples of marketing materials from nurseries or similar businesses

Topic	Time	Training Instructions	Resources
		▪ Group C: Draft a business card. ▪ Group D: Plan a WhatsApp/Facebook post advertising seedlings for sale. o Groups present their designs to the class. 3. **Discussion:** o Trainer asks: *Which marketing tools are cheapest? Which reach more people?* o Emphasise using a mix of local (signboard, cards) and digital (WhatsApp, social media) approaches. 4. **Key takeaway:** o Simple marketing activities (name, logo, signage, cards, and social media) help nurseries reach more buyers and build a recognisable reputation.	
7.3 Seedling quality	42 min	Explain that seedling quality is not only about plant health, but also about how customers view the nursery's reliability. Quality control is therefore a key part of **marketing and sales**. **Activity 49: Case Study – "Fatuma's Dilemma"** 1. Read or tell the following little case study to the learners. 2. Write the numbers on the board so learners can see the figures and make sense of them.	Flipchart and markers

Topic	Time	Training Instructions	Resources
		Case Study Story: Fatuma runs a small nursery in Morogoro. She has an order for 500 mango seedlings from a farmer's group. When checking her stock, she finds that about 60 seedlings are smaller and weaker than the rest. If she includes them, she can deliver the full 500 as promised. If she removes them, she can only supply 440 seedlings. **Discussion questions:** 1. What should Fatuma do? Deliver 500 including weak ones, or only 440 strong ones? Why? 2. How might each choice affect her nursery's reputation and future sales? 3. What does this tell us about the importance of **sorting and grading seedlings** before sale? **Key takeaway:** Seedling quality affects more than just the day's sales – it shapes the nursery's reputation, customer trust, and future business.	
7.4 Sales	36 min	Explain that selling seedlings is not just about handing them over. Proper sales include invoices, receipts, and sales records.	Copies of invoice and sales record in

Topic	Time	Training Instructions	Resources

		Stress that good sales practices protect both the nursery and the buyer.
		
		Activity 50: Demonstration & Practice – Selling Seedlings
		
		1. **Trainer demonstration:**
		  ○ Show a sample **invoice** (listing type, number, price, and total cost).
		  ○ Show a **receipt** given after payment.
		  ○ Demonstrate how to record the sale in the income section of the nursery's cashbook.
		  ○ Explain that if transport is needed, costs are usually added to the buyer's account.
		2. **Learner practice:**
		  ○ In pairs, one plays the buyer and the other the nursery operator.
		  ○ The "buyer" orders seedlings, the "operator" prepares an invoice, records payment, and issues a receipt.
		  ○ Groups then swap roles.
		3. **Discussion:**
		  ○ Trainer asks: *Why are receipts and records important for nurseries?*
		  ▪ Prevent disputes, track income, calculate profits.
		  ○ Ask: *How should transport costs be handled?*
		4. **Key takeaway:**
			Training Resources section.

Topic	Time	Training Instructions	Resources
		○ Proper sales include **invoices, receipts, recordkeeping, and clear cost agreements**, which build professionalism and trust.	

Module 8: Avocado

Topic	Time	Training Instructions	Resources
8.1 Varieties	24 min	**Activity 51: Brainstorm: Avocado Varieties** 1. Ask the learners if they know the names of any different kinds of avocado varieties grown locally. 2. Write these up on the flipchart/board. 3. Ask how they can tell them apart – write a short description or draw them next to the name of each on the list – different sizes, colours and shapes. 4. Show photos of each of the types – or, better still, have one of each of the types of avocados to show in class. 5. Discuss the advantages and disadvantages of different Varieties, and the ones most popular for the local domestic market, and for commercial markets like hotels and restaurants.	Samples or photos of different Varieties of avocados grown in Tanzania
8.2 Seed selection and preparation	192 min	**Activity 52: Demonstration and Practice: Avocado Seed Selection** 1. Remind learners that Seed Selection was discussed in Module 3, and that this will now be applied to avocado seed – selection and preparation. 2. Trainer shows several avocados of different quality (healthy, diseased, underripe, overripe). 3. Learners discuss: *Which fruits are best for taking seed? Why?*	Samples of avocado fruits: healthy, diseased, underripe, overripe Sets of avocado fruits

Topic	Time	Training Instructions	Resources
		4. Trainer demonstrates: o Cutting open a ripe, healthy avocado. o Carefully removing the seed. o Washing the seed to remove pulp and dirt. o Peeling off the thin brown seed coat. o Treating the seed (e.g., with fungicide or safe local substitute). o Drying seeds lightly in the shade (not direct sun). 5. Divide learners into groups. Each group receives a set of avocado fruits and practices the steps: extract, wash, peel, treat, and dry. 6. Groups compare their prepared seeds. Trainer checks quality and corrects mistakes. 7. Class discussion: *Why is good seed selection important?* (strong seedlings, disease-free, better market demand).	Water, buckets/ basins
8.3 Sowing	192 min	Remind learners of general sowing principles (Module 3): container size, sowing depth, and seed orientation. **Activity 53: Demonstration & Practice – Direct Sowing of Avocado Seeds** 1. Show a polytube/polybag filled with prepared nursery soil mix. 2. Make a hole 3–5 cm deep with a dibber.	Polytubes with nursery soil mix Avocado seeds Logbook

Topic	Time	Training Instructions	Resources
		3. Place one avocado seed per bag, with the broad end facing down and the pointed end facing up. 4. Cover lightly with soil and press gently. 5. Water lightly. 6. **Learner practice:** o Each learner receives 2–3 prepared seeds and polytubes. o They practise sowing seeds at the correct depth and orientation. o Trainer checks each learner's work. 7. **Seedbeds (optional method):** Trainer shows a small seedbed with prepared soil. Seeds are planted 5–10 cm apart in rows. Once seedlings reach 10–15 cm, they can be transplanted into polybags. 8. **Recordkeeping exercise:** Learners write in a simple logbook: date, number of seeds sown, and container type (direct in polytube or seedbed). 9. **Discussion:** *Why is correct depth and orientation important for avocado seeds?* (Helps even germination, avoids rotting, encourages strong root growth).	
8.4 Special growing conditions	12 min	Present a short lesson with images/photos of trees growing in different conditions (climate, soil, water, light). Explain that avocado seedlings need certain conditions to grow strong before they are ready for the field. Poor conditions make them weak and harder to sell.	Photos of avocado trees in different growing conditions (can be on a phone or printed, or projected)

Topic	Time	Training Instructions	Resources
		Activity 54: Group Discussion & Observation – Avocado Growing Needs 1. If possible: o Show seedlings growing under shade vs. seedlings exposed to too much sun. o Show healthy seedlings in well-drained soil vs. stunted ones in waterlogged soil (or use pictures). 2. Highlight key conditions: o **Climate:** prefers mild temperatures, avoid extreme heat or frost. o **Sunlight:** seedlings need partial shade when young; too much sun can burn leaves. o **Water:** steady supply but not waterlogging. o **Soil:** well-drained, fertile mix in polytubes. o **Space:** seedlings arranged neatly in rows for airflow and ease of work. 3. **Learner activity – Observation Walk (or Classroom Pictures):** o Learners walk around the nursery (or observe photos). o They note which seedlings look healthier and guess why. o Groups report: *Was it too much sun? Poor drainage? Not enough water?* 4. **Discussion:** o Trainer confirms answers and links back to the conditions required.	

Topic	Time	Training Instructions	Resources
		○ Ask: *What problems might happen if seedlings don't get these conditions?* (stunted growth, disease, poor sales). 5. **Key Takeaway:** • Good growing conditions = stronger seedlings = higher survival in the field = better income for the nursery.	
8.5 Pest Control	120 min	Remind learners that they already studied general nursery pests (Module 4). Now the focus is on pests that often affect avocado seedlings. **Activity 55: Observation & Discussion – Avocado-Specific Pests** 1. **Demonstration/Visual Aid:** ○ Show photos or samples of avocado leaves/stems affected by: ▪ **Aphids** – sucking sap, leaves curl or turn yellow. ▪ **Thrips** – silvery streaks on young leaves. ▪ **Rodents** – chew on stems and seeds. ○ Emphasise: weak seedlings are more likely to get pest attacks. 2. **Learner activity – Problem Spotting:** ○ Give groups pictures or real seedlings (healthy vs pest-damaged). ○ Learners identify *which is healthy, which is attacked, and how they can tell.* 3. **Discussion – Relevance to Avocado:**	Photos or samples of avocado leaves/ stems affected by different pests

Topic	Time	Training Instructions	Resources
		○ Ask: *What happens if avocado seedlings are sold with pest damage?* ▪ Lower survival in the field. ▪ Loss of customer trust. ▪ Poor market reputation. ○ Reinforce that daily scouting (Module 4 skill) must focus on spotting these avocado-specific signs. 4. Key takeaway: ○ Good pest management for avocado is about early recognition of specific problems and selling only clean, healthy seedlings.	
8.6 Disease Control	126 min	Remind learners that in Module 4 they studied *what diseases are* and *how they spread*. Now the focus is on **common avocado seedling diseases** that affect quality and sales. **Activity 56: Case Study & Observation – Avocado Diseases** 1. Show photos or samples of avocado seedlings affected by: ▪ **Root rot (Phytophthora)** – seedlings wilt, roots turn black and soft. ▪ **Anthracnose** – dark spots on leaves and stems. ▪ **Leaf spot diseases** – small brown or black patches on leaves. ○ Contrast with healthy seedlings for comparison. 2. **Learner activity – Spot the Difference:**	Photos or samples of avocado leaves/ stems affected by different diseases

Topic	Time	Training Instructions	Resources
		○ Divide learners into groups. ○ Give each group two pictures/seedlings: one healthy, one diseased. ○ Ask: *What differences can you see? Which would you sell, and which would you reject?* 3. **Discussion – Relevance to Avocado Nurseries:** ○ Emphasise that **selling diseased seedlings damages nursery reputation**. ○ Good practice: ▪ Keep nursery soil/media well-drained. ▪ Avoid overhead watering late in the day. ▪ Remove and destroy infected seedlings immediately. ▪ Use clean tools and media to prevent spread. 4. **Key takeaway:** ○ Avocado seedlings must be disease-free at the point of sale. Early detection and strict hygiene are the best control methods.	
8.7 Propagation	252 mins	Explain that while avocado can grow from seed, grafting is used in Tanzania to combine strong local rootstocks with high-yielding scions. Remind learners: **this gives trees that are both hardy in local soils and produce good fruit earlier.** **Activity 57: Demonstration & Practical – Grafting Avocado Seedlings**	Rootstock seedlings Scions Grafting tools and tape Small plastic bags

Topic	Time	Training Instructions	Resources
		1. Show a healthy **rootstock seedling** (grown from local seed, about pencil-thickness stem, 25–30 cm tall). 2. Show a **scion** (cut from a known high-quality mother tree). 3. Step-by-step demonstration of the **common technique in Tanzania – wedge (cleft) grafting**: o Cut the rootstock stem cleanly across at about 20–25 cm height. o Split the cut end with a sharp, clean knife (about 2–3 cm deep). o Shape the scion base into a wedge. o Insert the scion wedge firmly into the split rootstock. o Tie securely with grafting tape or clean polythene strip. o Cover with a small plastic sleeve/bag to reduce water loss and protect the graft union. 4. **Learner practice:** o Learners work in pairs: one holds the rootstock, the other practises shaping and inserting the scion. o Each learner repeats until they can complete the full process. o Trainer circulates, checking knife handling, cut angles, and binding tightness. 5. **Observation and Care:** o Show how to place grafted seedlings under shade for recovery. o Explain: remove plastic cover after 2–3 weeks once buds start growing.	

Topic	Time	Training Instructions	Resources
		○ Learners practise identifying which grafts have "taken" (scion sprouting) vs. which failed (scion dried out). 6. **Discussion:** ○ Ask: *What happens if you use diseased or poor scion material?* ○ Reinforce: Always choose scions from certified, healthy, productive trees. 7. **Key takeaway:** ○ Grafting is the most reliable method for avocado propagation in Tanzania. ○ Proper demonstration, careful practice, and hygiene are essential for success.	
8.8 Quality points of seedlings	132 min	**Activity 58: Inspection & Sorting – Good vs Poor Avocado Seedlings** 1. **Trainer demonstration:** Show 2–3 avocado seedlings – one healthy, one weak/diseased. 2. **Learner activity:** In small groups, learners inspect seedlings using simple criteria: ○ Strong upright stem. ○ Healthy green leaves (not yellow or spotted). ○ Well-developed, white roots (not black or circling). ○ Smooth, healed graft union.	

Topic	Time	Training Instructions	Resources
		3. Groups sort seedlings into **“Ready for Sale”** and **“Reject.”** 4. **Discussion:** Why selling only strong, clean seedlings protects the nursery’s reputation.	

Module 9: Mango

Topic	Time	Training Instructions	Resources
9.1 Varieties	24 min	**Activity 59: Brainstorm – Mango Varieties** 1. Ask learners if they know any mango varieties grown in their area (local and improved). 2. Write these names on the board or flipchart. 3. Ask: *How can we tell them apart?* Note differences in **fruit size, skin colour, fibre content, taste, and harvest season.** Add drawings or short notes next to each. 4. Show photos of different varieties – or, if possible, bring real mango fruits for demonstration. 5. Discuss: *Which varieties are most popular in local markets? Which are demanded by hotels, exporters, or juice processors?* 6. Summarise the advantages and disadvantages of different mango varieties (e.g., taste, yield, market value, storage).	Samples of mango fruits or pictures/ photos of different types of mangoes grown in Tanzania
9.2 Seed Selection and preparation	192 min	**Activity 60: Demonstration & Practice – Mango Seed Selection** 1. **Trainer demonstration:** o Show several mango fruits – some healthy, some damaged (diseased, overripe, underripe).	Samples of mango fruits: healthy, diseased, underripe, overripe

Topic	Time	Training Instructions	Resources
		○ Ask learners: Which fruits are best for seed? Why? ○ Cut open a healthy, ripe mango. ○ Remove the seed (stone) from the pulp. ○ Wash the seed thoroughly in clean water. ○ Carefully remove the husk to expose the kernel inside (this improves germination and reduces fungal attack). ○ Lightly dry the seed in the shade (not in direct sun). ○ Optional: treat with fungicide or safe alternative. 2. **Learner practice:** ○ Learners work in small groups with mango fruits. ○ Each group selects, extracts, washes, and prepares seeds as demonstrated. ○ Trainer checks technique and corrects mistakes. 3. **Discussion:** ○ Why prepare mango seeds this way? (better germination, stronger seedlings, disease prevention). ○ Reminder: mango seeds lose viability quickly — they should be planted soon after preparation.	Mango fruits (can be old/overripe ones from a market or orchard) Water, buckets/ basins
9.3 Sowing	192 min	Remind learners that mango seeds lose viability quickly, so they must be sown soon after preparation.	Polytubes with nursery soil mix Mango seeds

Topic	Time	Training Instructions	Resources
		Activity 61: Demonstration & Practice – Sowing Mango Seeds 1. **Demonstration (Direct sowing):** o Show a polytube/polybag filled with well-prepared nursery media. o Make a hole about 3–5 cm deep. o Place the seed flat (on its side) in the hole. o Cover lightly with soil and press gently. o Water lightly after sowing. 2. **Alternative method (Seedbed):** o Seeds may also be planted in raised nursery beds, about 5 cm apart in rows. o Once seedlings are 10–15 cm tall, they are transplanted into polybags. 3. **Learner practice:** o Each learner receives mango seeds and polytubes. o Practise sowing correctly at the right depth and orientation. o Trainer checks each seedling bag to confirm proper sowing. 4. **Recordkeeping exercise:** o Learners record the date, number of seeds sown, and method (direct in polytube or in seedbed). 5. **Discussion:** o Ask: *What problems happen if seeds are sown too deep or not flat?*	Logbook

Topic	Time	Training Instructions	Resources
		○ Emphasise: correct sowing ensures quick, uniform germination and strong seedling growth.	
9.4 Special growing conditions/needs	12 min	Explain that mango seedlings need certain conditions in the nursery to grow strong and healthy. Poor conditions make them weak and harder to sell. **Activity 62: Group Discussion & Observation – Mango Growing Needs** 1. Show two sets of seedlings (or photos): ○ Healthy seedlings in well-drained soil with enough light. ○ Weak seedlings in waterlogged soil or under too much shade. 2. Highlight key mango requirements: ○ **Climate:** warm temperatures; avoid cold or frost. ○ **Sunlight:** seedlings need plenty of light but should be shaded when very young. ○ **Water:** regular watering but avoid waterlogging. ○ **Soil:** deep, fertile, and well-drained soil mix. ○ **Air circulation:** good spacing between seedlings to reduce disease. 3. **Learner activity – Observation Walk (or Picture Exercise):** ○ Learners compare healthy vs weak seedlings. ○ Groups discuss: *What condition was missing?*	Samples of seedlings - healthy and weak (or photos)

Topic	Time	Training Instructions	Resources
		○ Report back findings (too much water, not enough sun, poor soil). 4. **Discussion:** ○ Trainer confirms answers and links to nursery management practices. ○ Ask: *Why is it important to provide the right conditions for mango seedlings?* 5. **Key takeaway:** ○ Correct growing conditions = stronger seedlings, higher survival in the field, better reputation and sales for the nursery.	
9.5 Pest Control	120 min	Remind learners that they already learned general pest control in Module 4. Now the focus is on pests that commonly attack mango seedlings. **Activity 63: Observation & Discussion – Mango-Specific Pests** 1. Show photos or samples of mango seedlings/leaves with pest damage, such as: ○ **Mango hoppers** – small insects that suck sap, leaving sticky honeydew and causing leaf drying. ○ **Aphids** – clusters on young shoots, leaves curl and turn yellow. ○ **Leaf-eating caterpillars** – holes and chewed leaves. ○ **Rodents** – chew stems or seeds in the nursery. 2. **Learner activity – Spot the Problem:**	Samples or photos of mango seedlings with pest damage

Topic	Time	Training Instructions	Resources
		○ Groups are given 2–3 pictures of healthy vs pest-damaged mango seedlings. ○ Task: identify *which are attacked, what pest may be responsible, and why the seedling would be rejected for sale*. 3. **Discussion:** ○ Trainer asks: *What happens if nurseries sell seedlings with pest damage?* ▪ Poor survival in the field. ▪ Loss of customer trust. ▪ Lower income and bad reputation. ○ Emphasise that **daily scouting** must focus on spotting these mango-specific pests early. 4. **Key takeaway:** ○ Mango seedlings must be **pest-free before sale**. Early detection and quick action protect both the nursery's product quality and reputation.	
9.6 Disease Control	126 min	Explain that mango seedlings can be attacked by certain diseases that reduce their quality. Farmers will not buy diseased seedlings, so nursery managers must recognise and remove them early. **Activity 64: Case Study & Observation – Mango Seedling Diseases**	Pictures or real examples of mango seedlings with common diseases

Topic	Time	Training Instructions	Resources
		1. Show pictures or real examples of mango seedlings with common diseases: o **Anthracnose** – dark spots on leaves and stems; young shoots may die back. o **Powdery mildew** – white powder-like growth on leaves and shoots. o **Root rot (Phytophthora)** – seedlings wilt, roots turn black and rot. o Compare these with healthy seedlings. 2. **Learner activity – Spot the Disease:** o Groups are given a set of images (healthy vs diseased). o Task: identify which seedlings are diseased and explain why they should not be sold. 3. **Discussion:** o Trainer asks: *What happens if mango seedlings with disease reach the customer?* ▪ High mortality in the field. ▪ Complaints and loss of trust. ▪ Damaged nursery reputation. o Prevention tips: ▪ Use clean media and tools. ▪ Avoid overhead watering late in the day. ▪ Remove and destroy infected seedlings immediately.	

Topic	Time	Training Instructions	Resources
		4. **Key takeaway:** o Mango seedlings must be **disease-free at the point of sale**. Hygiene and careful inspection protect both the seedlings and the nursery business.	
9.7 Propagation	252 mins	Explain that while mango can grow from seed, grafting ensures seedlings produce **true-to-type fruit** and bear earlier (2–3 years vs 7+ years). Rootstock is raised from local seed (strong and adapted to soils). The scion comes from a **healthy, high-yielding mother tree** of a known variety. **Activity 65: Demonstration & Practical – Grafting Mango Seedlings** 1. Show a **rootstock seedling** (pencil-thick, 20–25 cm tall). 2. Show a **scion** (healthy shoot from a known variety). 3. Demonstrate the **common technique – cleft grafting**: o Cut the rootstock stem horizontally at 20 cm height. o Split the cut end (2–3 cm deep). o Shape the scion base into a wedge. o Insert the scion into the split rootstock. o Bind tightly with grafting tape or clean plastic strip. o Cover with a small polythene bag to protect the graft.	Rootstock seedlings Scions Grafting tools and tape Small plastic bags

Topic	Time	Training Instructions	Resources
		4. **Learner practice:** o Learners work in pairs to practise making the cuts and binding the scion. o Trainer checks for clean cuts, firm unions, and safe knife handling. 5. **Observation and care:** o Trainer explains aftercare: place grafted seedlings in shade, water lightly, and check grafts daily. o Remove cover after 2–3 weeks if scion is sprouting. o Learners practise identifying a successful graft (green bud growth, healed union) vs. a failed one (dried scion). 6. **Discussion:** o Why grafting matters: earlier fruiting, better quality, higher price. o Risks: if scions are diseased, the graft will fail – always choose clean, healthy material. 7. **Key takeaway:** o Grafting is the best method for mango propagation in Tanzania. o Success depends on good technique, hygiene, and aftercare.	
9.8 Quality points of seedlings	132 min	**Activity 66: Inspection & Sorting – Good vs Poor Mango Seedlings** 1. Show 2–3 mango seedlings – some healthy, some weak/diseased. 2. In groups, learners inspect seedlings using simple criteria:	2–3 mango seedlings

Topic	Time	Training Instructions	Resources
		○ Strong, upright stem. ○ Healthy green leaves (not yellow, curled, or spotted). ○ Well-developed roots that are not circling or rotten. ○ Smooth, firm graft union (well-healed, no cracks). 3. Groups sort seedlings into **“Ready for Sale”** and **“Reject.”** 4. **Discussion:** Trainer asks: *Why is it important to sell only strong, uniform seedlings?* (customer trust, nursery reputation, higher income).	

Module 10: Orange

Topic	Time	Training Instructions	Resources
10.1 Varieties	24 min	**Activity 67: Brainstorm – Orange Varieties** 1. **Ask learners** if they know different orange varieties grown locally (e.g., Valencia, Washington Navel, Msasa, local sweet oranges). 2. **Write names** on the board or flipchart. 3. **Ask:** *How can we tell them apart?* Note differences in **fruit size, skin colour, sweetness, seediness, harvest season.** Add drawings or short notes next to each. 4. **Show photos** of the main orange varieties – or real fruits if available. 5. **Discuss market demand:** Which varieties are popular in village markets? Which are demanded by hotels, juice processors, or exporters? 6. **Summarise** the advantages and disadvantages of different varieties (taste, yield, disease resistance, storage life).	Samples or pictures of different types of oranges grown in Tanzania
10.2 Seed selection and preparation	192 min	**Activity 68: Demonstration & Practice – Orange Seed Preparation** 1. Show ripe orange fruits – some healthy, some diseased/damaged. 2. Ask learners: *Which fruit is best for seed? Why?* 3. Cut open a healthy fruit and extract seeds.	Ripe oranges – some healthy, some diseased or damaged. Knife Water

Topic	Time	Training Instructions	Resources
		4. Wash seeds in clean water to remove pulp and jelly-like coating. 5. Lightly air-dry in the shade (do not dry completely). 6. Optional: soak seeds in clean water for 12–24 hours to improve germination. 7. Remind learners: orange seeds **lose viability quickly** and must be planted soon after preparation. 8. **Learner practice:** o Learners work in groups to extract, wash, and prepare orange seeds. o Trainer checks each group's prepared seeds. 9. **Discussion:** o Why select and prepare seeds carefully? (Stronger seedlings, less disease, faster germination). o Why is quick sowing important for citrus? (Seeds lose viability if stored too long).	
10.3 Sowing	192 min	Explain that orange seeds can be sown either **directly in polybags** or first in a **seedbed** and later transplanted into polybags. **Activity 69: Demonstration & Practice – Sowing Orange Seeds** 1. **Demonstration – Direct Sowing (Polybags):** o Show a polybag filled with nursery media.	Polytubes with nursery soil mix Orange seeds Seedbed Logbook

Topic	Time	Training Instructions	Resources
		○ Make a hole 2–3 cm deep. ○ Place **one seed per bag**, with the pointed end slightly up. ○ Cover lightly with soil and press gently. ○ Water lightly after sowing. 2. **Demonstration – Indirect Sowing (Seedbeds):** ○ Show how to prepare a raised seedbed (about 1 m wide, 15–20 cm high). ○ Sow seeds in rows, 5 cm apart, 10 cm between rows. ○ Cover lightly with soil and water. ○ Once seedlings are 10–15 cm tall, transplant into polybags. 3. **Learner practice:** ○ Learners each sow seeds in polybags (direct method). ○ In groups, learners also practise sowing in a small seedbed. ○ Trainer checks depth, spacing, and covering. 4. **Recordkeeping exercise:** ○ Learners record in a logbook: date, number of seeds sown, method (direct or seedbed). 5. **Discussion:** ○ Ask: *What happens if orange seeds are sown too deep, too shallow, or too many in one bag?* ○ Reinforce: correct sowing = better germination and stronger seedlings.	

Topic	Time	Training Instructions	Resources
10.4 Special growing conditions	12 min	Explain that orange seedlings have particular needs to stay healthy in the nursery. If these are not met, seedlings will be weak and hard to sell. **Activity 70: Group Discussion & Observation – Orange Growing Needs** 1. Show two sets of seedlings (or photos): o Healthy, strong seedlings grown with correct conditions. o Weak, yellow, or stunted seedlings grown with poor conditions (too much shade, waterlogging, or nutrient deficiency). 2. Highlight key orange requirements: o **Climate:** warm temperatures, no frost. o **Sunlight:** seedlings need good light; young seedlings may need shade but not too much. o **Water:** regular watering, avoid waterlogging. o **Soil:** fertile, well-drained nursery media. o **Spacing:** keep seedlings in rows for good airflow and easier management. 3. **Learner activity – Compare and Report:** o Learners look at healthy vs weak seedlings (live or in pictures). o In groups, they discuss what might have gone wrong in the weak ones (too much water? not enough sun? poor soil?).	

Topic	Time	Training Instructions	Resources
		○ Each group shares their answer. 4. **Discussion:** ○ Trainer confirms the reasons and links to correct nursery practices. ○ Ask: *Why is it important to maintain proper growing conditions for orange seedlings?* 5. **Key takeaway:** ○ Correct growing conditions lead to strong seedlings, better field survival, and higher customer satisfaction.	
10.5 Pest Control	120 min	Remind learners that general pest control was covered in Module 4. Now they will focus on pests that often affect orange seedlings. **Activity 71: Observation & Discussion – Orange-Specific Pests** 1. Show pictures or samples of pest damage on orange seedlings, such as: ○ **Aphids** – clusters on young shoots, causing curled and yellow leaves. ○ **Leaf miners** – winding trails inside leaves. ○ **Scale insects** – small, hard bumps on stems and leaves, sucking sap. ○ **Rodents** – chewing of stems or seeds. 2. **Learner activity – Spot the Problem:** ○ Groups are given healthy and pest-damaged orange seedlings (or photos).	Pictures or samples of pest damage on orange seedlings

Topic	Time	Training Instructions	Resources
		○ Task: identify the signs of pest damage and discuss why such seedlings cannot be sold. 3. **Discussion:** ○ Trainer asks: *What will happen if a nursery sells pest-damaged orange seedlings?* ▪ Farmers lose money when seedlings fail. ▪ Customers lose trust in the nursery. ▪ Nursery reputation suffers. ○ Emphasise: Daily nursery scouting must include careful observation of these specific pest signs in oranges. 4. **Key takeaway:** ○ Orange seedlings must be **pest-free before sale**. ○ Early detection and immediate action keep the nursery's products marketable and trusted.	
10.6 Disease Control	126 min	Remind learners that they already learned what diseases are and how they spread in Module 4. Now the focus is on **common diseases of orange seedlings**. **Activity 72: Case Study & Observation – Orange Seedling Diseases** 1. Show photos or samples of seedlings with disease symptoms such as:	Photos or samples of seedlings with disease symptoms

Topic	Time	Training Instructions	Resources
		○ **Damping-off** – seedlings collapse at the base and die. ○ **Citrus canker** – raised brown lesions on leaves and stems. ○ **Root rot (Phytophthora)** – seedlings wilt, roots turn dark and rotten. ○ Compare these with healthy seedlings. 2. **Learner activity – Spot the Disease:** ○ In groups, learners study healthy vs diseased samples/photos. ○ They identify diseased seedlings and explain why they cannot be sold. 3. **Discussion:** ○ Trainer asks: *What happens if diseased seedlings reach farmers?* ▪ They spread disease to orchards. ▪ Farmers lose money and trust in the nursery. ○ Prevention **tips:** ▪ Use clean nursery soil and tools. ▪ Avoid waterlogging and overcrowding. ▪ Remove diseased seedlings immediately and destroy them. 4. **Key takeaway:** ○ Orange seedlings must be **disease-free before sale**. Good hygiene and regular checks protect both customers and the nursery's business reputation.	

Topic	Time	Training Instructions	Resources
10.7 Propagation	252 mins	Explain that oranges can be grown from seed, but seedlings may not produce fruit true-to-type. The best method is **vegetative propagation** (budding or grafting) using: • **Rootstock:** grown from seed, strong and disease-resistant. • **Scion/budwood:** cut from a healthy, high-yielding mother tree of a known variety. **Activity 73: Demonstration & Practical – Budding Orange Seedlings** 1. Show a healthy rootstock seedling (pencil-thick stem, 20–25 cm tall). 2. Demonstrate **T-budding (common in Tanzania):** o Make a T-shaped cut in the rootstock bark. o Cut a bud shield (a piece of bark with a bud) from the scion. o Insert the bud under the bark flap of the rootstock. o Tie firmly with budding tape or polythene strip, leaving the bud exposed. o After 2–3 weeks, if the bud remains green and alive, cut back the rootstock above the bud to encourage bud growth. • **Learner practice:** o Learners work in pairs with practice seedlings and budwood. o They repeat the budding process until they can complete all steps.	Rootstock seedlings Buds Budding tools and tape Small plastic bags

Topic	Time	Training Instructions	Resources
		○ Trainer checks knife handling, accuracy of cuts, and secure binding. • **Observation and care:** ○ Trainer explains: successful budding shows swelling and bud growth. ○ Failed budding shows dry, black, or dead buds. ○ Learners observe examples of successful vs failed buds. • **Discussion:** ○ Ask: *Why is budding important for citrus?* ▪ Ensures true-to-type fruit. ▪ Earlier fruiting. ▪ Better disease resistance. • **Key takeaway:** ○ Budding is the preferred propagation method for oranges in Tanzania. ○ Success requires **good technique, clean tools, and healthy scion material.**	
10.8 Quality points of seedlings	132 min	**Activity 74: Inspection & Sorting – Good vs Poor Orange Seedlings** 1. Show orange seedlings – some strong, some weak/diseased. 2. In groups, learners inspect seedlings using a simple checklist: ○ Strong, upright stem. ○ Healthy green leaves (no yellowing, spots, or curling).	Orange seedlings

Topic	Time	Training Instructions	Resources
		○ Well-developed roots (not circling or rotten). ○ Graft or bud union smooth, well-healed, and firm. 3. Groups sort seedlings into **“Ready for Sale”** and **“Reject.”** 4. **Discussion:** Trainer asks: *Why must nurseries sell only healthy, uniform seedlings?* (protects farmer success, builds trust, strengthens nursery reputation).	

Module 11: Papaya

Topic	Time	Training Instructions	Resources
11.1 Varieties	24 min	**Activity 75: Brainstorm and Discussion– Papaya Varieties** 1. **Ask learners** if they know different papaya varieties grown in their area (local and improved types, e.g., Solo, Red Lady, Sunrise, local tall varieties). 2. **Write names** on the board or flipchart. 3. **Ask:** *How can we tell them apart?* Note differences in **fruit size, shape, flesh colour, sweetness, and growth habit.** Add drawings or short notes next to each. 4. **Show photos** of different papaya varieties – or real fruits if available. 5. **Discuss market demand:** Which varieties are most popular for home use? Which are demanded by hotels, exporters, or juice processors? 6. **Summarise** advantages and disadvantages of local vs improved papaya varieties (e.g., yield, taste, shelf-life, disease resistance).	Samples of different types of papayas

11.2 Seed Selection and preparation	192 min	**Activity 76: Demonstration & Practice – Papaya Seed Preparation**
		
		1. **Trainer demonstration:**
		  ○ Show ripe papaya fruits – some healthy, some diseased or damaged.
		  ○ Ask learners: Which fruits are best for seed? Why?
			Ripe papaya fruits – some healthy, some diseased or damaged
			
			Knife

Topic	Time	Training Instructions	Resources
		○ Cut open a healthy, ripe papaya. ○ Scoop out the seeds. ○ Wash seeds in clean water to remove the sticky coating (gel-like layer). ○ Rub seeds with ash or sand if needed to help remove the coating. ○ Lightly dry in the shade for 1–2 days (do not dry in strong sun). ○ Remind learners: papaya seeds **lose viability quickly** and should be planted soon after preparation. 2. **Learner practice:** ○ Learners work in small groups to extract, wash, and prepare papaya seeds. ○ Trainer observes and corrects technique. 3. **Discussion:** ○ Why is removing the sticky coating important? (It contains inhibitors that slow germination). ○ Why must seeds be sown soon? (Papaya seeds cannot be stored long).	Water Ash or sand
11.3 Sowing	192 min	Explain that papaya is usually raised from seed, either sown directly into polybags or first in seedbeds or seed trays before transplanting. **Activity 77: Demonstration & Practice – Sowing Papaya Seeds** 1. **Demonstration – Direct Sowing (Polybags):**	Polytubes with nursery soil mix Papaya seeds Seed trays Seedbeds

Topic	Time	Training Instructions	Resources
		○ Show a polybag filled with nursery soil mix. ○ Make a shallow hole 1–1.5 cm deep. ○ Place **3–4 seeds per bag**. ○ Cover lightly with soil and water gently. ○ Explain: later, weaker seedlings will be thinned to leave 1–2 strong ones. 2. **Demonstration – Indirect Sowing (Seedbeds):** ○ **Seedbeds:** ▪ Prepare a raised seedbed, 1 m wide and 15–20 cm high. ▪ Sow seeds in shallow rows, 5 cm apart. ▪ Cover lightly with soil. ○ **Seed trays:** ▪ Show how to fill a seed tray with soil media. ▪ Make a shallow hole in each cell, 1–1.5 cm deep. ▪ Place 1 or 2 seeds per cell. ○ Once seedlings reach 10–15 cm in height, transplant the healthiest into polybags. 3. **Learner practice:** ○ Learners practise sowing methods (direct in bags, in seedbeds and in seed trays). ○ Trainer checks sowing depth, seed numbers, and covering.	Logbook

Topic	Time	Training Instructions	Resources
		4. **Recordkeeping exercise:** o Learners record: number of bags sown, number of seeds per bag, and sowing date. 5. **Discussion:** o Ask: *Why plant several seeds per bag?* (to avoid empty bags if some seeds fail). o *Why thin later?* (to allow strong seedlings to thrive without competition).	
11.4 Special growing conditions	12 min	Explain that papaya seedlings grow quickly but need the right conditions to stay strong and healthy in the nursery. **Activity 78: Group Discussion & Observation – Papaya Growing Needs** 1. Show examples (or pictures) of papaya seedlings grown under different conditions: o Healthy seedlings – good light, fertile soil, regular watering. o Weak seedlings – yellow leaves from poor nutrition, wilted from water stress, or stunted in too much shade. 2. Highlight papaya requirements: o **Climate:** warm temperatures, papaya is sensitive to cold and frost. o **Sunlight:** seedlings need full sun but may require light shade when very young.	Pictures of papaya seedlings grown under different conditions

Topic	Time	Training Instructions	Resources
		○ **Water:** regular watering but avoid waterlogging. ○ Soil**:** fertile, well-drained soil with good organic matter. ○ **Spacing:** seedlings should be arranged with enough room for airflow. 3. **Learner activity – Compare and Report:** ○ In groups, learners observe healthy vs weak seedlings. ○ They discuss: *What condition was missing?* (water, light, nutrients, space). ○ Groups report back. 4. **Discussion:** ○ Trainer confirms correct answers and links back to good nursery practices. ○ Ask: *Why is papaya more sensitive to poor conditions than some other fruit trees?* (fast-growing, shallow roots, needs steady care). 5. **Key takeaway:** ○ Strong papaya seedlings come from **balanced light, water, soil, and spacing.** ○ Meeting these conditions ensures healthy seedlings ready for sale or planting.	
11.5 Pest Control	120 min	Remind learners that they already studied *general pest control* in Module 4. Now the focus is on pests that are common in **papaya nurseries**.	Papaya seedlings (or photos) with pest damage

Topic	Time	Training Instructions	Resources

		Activity 79: Observation & Discussion – Papaya-Specific Pests
		
		1. Show seedlings (or photos) with pest damage:
		  ○ **Aphids** – clusters on shoots, causing leaf curling and yellowing.
		  ○ **Red spider mites** – tiny pests that cause speckled, yellow leaves, especially in dry conditions.
		  ○ **Cutworms** – larvae that cut young seedlings at the base.
		  ○ **Rodents** – chewing seeds and tender stems.
		2. **Learner activity – Spot the Damage:**
		  ○ Groups study samples/photos of healthy vs pest-damaged seedlings.
		  ○ They identify which pests might be responsible and why such seedlings would not be sold.
		3. **Discussion:**
		  ○ Trainer asks: *What happens if papaya seedlings are sold with pest problems?*
		  ▪ Farmers lose money.
		  ▪ Nursery loses reputation and repeat business.
		  ○ Reinforce the importance of **daily scouting** and early intervention.
		4. **Key takeaway:**
		  ○ Papaya seedlings must be pest-free before sale.
			Sample of a cutworm

Topic	Time	Training Instructions	Resources
		○ Good sanitation, observation, and timely control ensure seedlings remain healthy and market ready.	
11.6 Disease Control	126 min	Remind learners that they already learned the *general principles of disease control* in Module 4. Now the focus is on **papaya-specific diseases** that affect nurseries. **Activity 80: Case Study & Observation – Papaya Seedling Diseases** 1. Show pictures or samples of seedlings with common papaya diseases: ○ **Damping-off** – young seedlings collapse at the base and die. ○ **Powdery mildew** – white, powder-like growth on leaves. ○ **Leaf spot** – brown or black patches on leaves. ○ **Papaya mosaic virus** – mottled, distorted leaves. 2. Compare with healthy seedlings for contrast. 3. **Learner activity – Spot the Disease:** ○ Groups are given pictures/samples (healthy vs diseased seedlings). ○ Task: identify which seedlings are diseased and explain why they cannot be sold. 4. **Discussion:** ○ Trainer asks: *What happens if diseased papaya seedlings are sold to farmers?*	Pictures or samples of seedlings with common papaya diseases

Topic	Time	Training Instructions	Resources
		▪ They spread disease to farmers' fields. ▪ Farmers lose yield and trust. ▪ The nursery's reputation is damaged. o Prevention tips: ▪ Use clean nursery soil/media. ▪ Avoid overcrowding seedlings. ▪ Water correctly (avoid too much moisture). ▪ Remove and destroy infected seedlings immediately. 5. **Key takeaway:** o Papaya seedlings must be **disease-free at the point of sale**. o Good hygiene and careful inspection are the best ways to protect both the farmer and the nursery.	
11.7 Propagation	252 mins	Explain that unlike avocado, mango, or orange, papaya is **not usually propagated by grafting or budding**. Papaya grows fast and true-to-type from seed when good mother plants are chosen. As they are small seeds, they are usually sown indirectly then transplanted as opposed to the other fruits trees that are direct sown then grafted or budded. Emphasise the importance of seed selection and sowing for papaya instead of propagation methods.	Seed trays/seed bed with papaya seedlings Polytubes filled with soil media Scissors or secateurs

Topic	Time	Training Instructions	Resources
		Activity 81: Demonstration and practice: transplanting papaya 1. Show seedlings that are the right size for transplanting. 2. Demonstrate how to gently lift papaya seedlings and prune roots if needed. 3. Show how to plant them into prepared polytubes at the right depth and pressing the soil down then watering. 4. Learners to practice transplanting a batch of papaya seedlings into polytubes.	
11.8 Quality points of papaya seedlings	132 min	**Activity 82: Inspection & Sorting – Good vs Poor Papaya Seedlings** 1. Show papaya seedlings – some strong, some weak/diseased. 2. In groups, learners inspect seedlings using simple criteria: o Straight, upright stem. o Healthy green leaves (no yellowing, curling, or spots). o Well-developed roots (not circling or rotten). o Seedlings uniform in size and growth. 3. Groups sort seedlings into **"Ready for Sale"** and **"Reject."** 4. **Discussion:** Trainer asks: *Why must nurseries sell only strong, healthy papaya seedlings?* (ensures farmer success, reduces complaints, builds nursery reputation).	Samples of papaya seedlings in the nursery

Training Resources

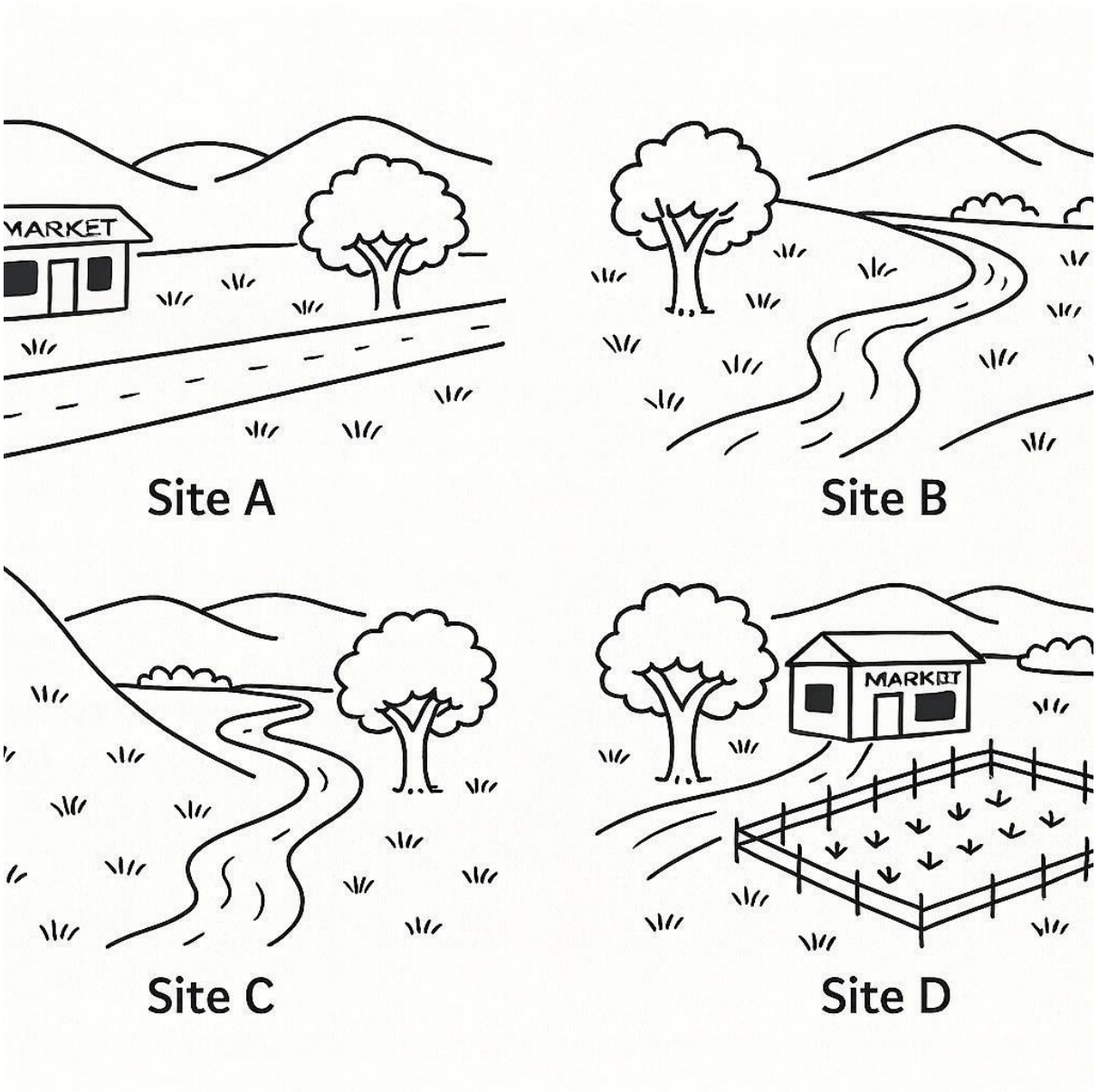
Activity 2: Fruit Tree Journey Flashcards

Suppliers (fertiliser, tools, polybags, seeds, scions)
Nurseries (raising seedlings)
Farmers (buying seedlings to plant)
Other buyers (domestic buyers, other nurseries)
Transport (moving seedlings)
Support services (extension officers, agro-shops)

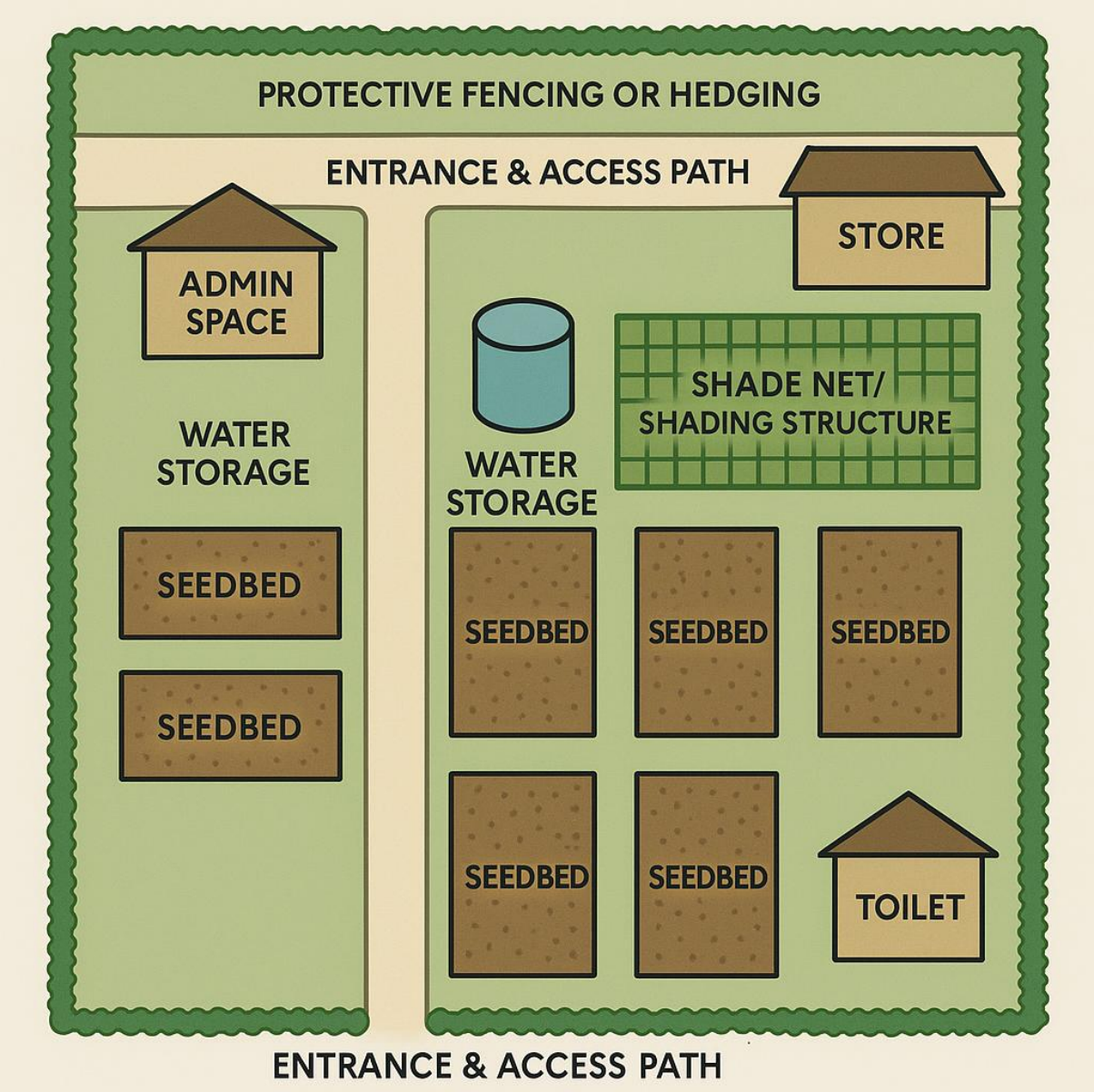
Activity 5: The Heavy Basket Card

Seeds	Price changes
Pests	Weather
Transport	Knowledge
Capital/money	Market demand

Activity 6: Site Selection Picture examples



Activity 7: Fruit Tree Nursery Layout Example



Activity 9: Nursery Security Checklist



Activity 14: Seed Sowing Record

Date Sown	Fruit Type	Variety	Source of Seed	Method (Direct/Indirect)	Container/ Tray No.	Qty Sown	Germination Date	Germinated (No.)	Transplanted Date	Notes

Activity 28: Types of Pests

1. Insects

Insect	Damage	Identification
Whiteflies	Suck sap from leaves, weakening the plant	 
Leaf Miners	Larvae that burrow inside leaves, leaving winding trails.	  
Aphids	Small soft-bodied insects that feed on sap and spread disease	 
Scale insects	Stick to stems and leaves, sucking sap and causing stunted growth.	 
Thrips	Tiny insects that damage flowers and young leaves, causing distortion.	 

Insect	Damage	Identification	
Spider mites (especially in dry nurseries)	Spider mites suck sap from seedling leaves, causing yellow spots, fine webbing, and eventual leaf drying.		

2. Rodents

	Damage	Appearance
Rats **(Black rat – *Rattus rattus*, and Norway rat – *Rattus norvegicus*)**	Very common around nurseries, especially near villages or storage areas. They dig up and eat freshly planted seeds such as mango, avocado, and papaya. They gnaw tender seedling stems and roots, which can kill young plants.	
Mice **(House mouse – *Mus musculus*)**	Feed on small seeds (like papaya and citrus) and nibble on roots or leaves of seedlings in polytubes. They are much smaller than other rodents.	
Multimammate rat	Eats seeds, seedlings, and sometimes gnaws on stems and roots of vegetables.	

Activity 34: Scouting Checklist

Date	Moisture content (OK/ Too dry/ Too wet)	Pests & diseases found? (Y/N & details)	Fertiliser needed? (Y/N)	Growth performance (Good /Fair /Poor)	Water drainage OK? (Y/N)	Stock in storage (Fertiliser, etc.)	Equipment & infrastructure condition	Action taken / Notes	Inspector's name & signature

Activity 35: Flashcards

Container half-filled with soil
Container leaning, not upright
Seed sown too deep
Soil in seedbed reused without change
Seedling pulled roughly from the soil
Roots exposed to air after lifting
Transplanting delayed for too long
Air space left around roots in container
Roots pruned too harshly
Roots not pruned before transporting to the field
Container filled firmly, no air gaps
Container upright and stable

Seed sown at correct shallow depth
Fresh soil/media used for each production cycle
Seedling lifted gently with soil around roots
Roots kept covered during transplanting
Seedlings transplanted at the right time
Roots well-fitted in soil, no empty spaces
Roots pruned carefully to encourage downward growth
Seedlings checked and pruned before transport to the field

Activity 41: Nursery Calendar

Activities	Months of the Year											
	J	F	M	A	M	J	J	A	S	O	N	D

Activity 46: Nursery Recordkeeping

Potting records show when pots were filled, the type of potting mix used, and the quantity prepared. This helps plan media requirements and match pot production to sowing and transplanting schedules.

Date	Type of Potting Mix	Qty Prepared (No. of Pots)	Person Responsible	Notes
05/03/2025	*Soil + Sand + Compost (2:1:1)*	500	*Asha*	*For mango seedlings*

Sowing records detail the date seeds were sown, crop or tree species, variety, seed source, and seed rate. These records make it possible to assess germination rates and plan re-sowing if needed.

Date	Species / Variety	Seed Source	Quantity Sown	Bed / Tray Number	Notes
06/03/2025	*Mango – Apple Variety*	*AgroSeeds*	*200 seeds*	*Bed 3*	*Expected germination in 14 days*

Pest control records list the date, type of pest found, control method used (chemical, biological, or manual), product name, dosage, and results. This helps track pest outbreaks and evaluate the success of treatments.

Date	Pest Name	Crop/Species Affected	Control Method	Product & Dosage	Person Responsible	Results
08/03/2025	*Aphids*	*Citrus seedlings*	*Spraying*	*Neem oil 30ml/15ℓ water*	*Peter*	*Aphid numbers reduced*

Disease control records are similar to pest control logs, but focus on diseases affecting seedlings. They include the name of the disease, symptoms observed, treatment applied, and follow-up inspections.

Date	Disease Name	Crop/Species Affected	Treatment	Product & Dosage	Person Responsible	Results
10/03/2025	*Powdery Mildew*	*Mango seedlings*	*Spraying*	*Sulphur fungicide 20g/15ℓ*	*Jane*	*Controlled after 2 sprays*

Inventory or stock records track all inputs such as fertilisers, pesticides, tools, and equipment, as well as plant stock. These records help prevent shortages, over-purchasing, and wastage.

Date	Category	Item Name	Unit	Quantity in Stock	Quantity Used	Balance	Supplier	Notes
05/03 /2025	*Fertiliser*	*NPK 17:17:17*	*kg*	*100*	*20*	*80*	*AgroFarm Ltd*	*Store dry*

Nursery scouting records document regular inspections of the nursery, noting plant health, pest or disease presence, irrigation problems, and other observations. They are an early warning system for potential problems.

Date	Area / Bed Checked	Observations	Pest/Disease Present	Action Taken	Person Responsible
07/03/2025	*Bed 2*	*Yellowing leaves*	*None*	*Added compost*	*Asha*

Financial records cover all income and expenditure. These allow the nursery manager to monitor cash flow, prepare budgets, and assess profitability.

Date	Description	Category (Expenditure / Income)	Quantity	Unit Price	Total Amount	Notes
05/03/2025	*Sale of mango seedlings*	*Income*	*200*	*3,000 TZS*	*600,000 TZS*	*Sold to local farmer*

Activity 50: Sales records

Sales records list the date, buyer, quantity sold, unit price, and total value for each sale. They provide information on market demand and help plan production to meet customer needs.

Date	Buyer Name	Product Sold	Quantity	Unit Price	Total Value	Payment Received?	Notes
06/03/2025	*Mr. K. Mwangi*	*Grafted avocado seedlings*	*50*	*5,000 TZS*	*250,000 TZS*	*Yes*	*Delivered to farm*

Invoice

INVOICE				
Invoice Number:				
Date:				
Buyer Name:				
Location of Sale:				
No.	**Fruit Tree**	**Quantity Sold**	**Price per Unit (TZS)**	**Total (TZS)**
1	[e.g. Avocado]	[e.g. 10]	[e.g. 1,000]	[e.g. 10,000]
2				
3				
	Transport			
	Total Amount			**[e.g. 25,000]**

Payment Method:	**[Cash / M-Pesa / Other]**
Amount Paid:	[TZS]
Balance Due (if any):	[TZS]
Signature (Farmer):	_____
Signature (Buyer):	_____

Sales Record

Date	Invoice No	Buyer	Value
		Total sales for the month	