



Lesson Plan 01: Coffee Nursery bed preparation

TOTAL TIME: 2 hours

AUDIENCE: CWS staff and cooperative leaders

FACILITATOR: CUP2 Master trainer

LOCATION: Demonstration plot

OBJECTIVES:

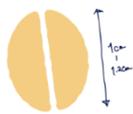
- **OBJECTIVE 1:** Understand the importance of the seedbed and a good time to set it up
- **OBJECTIVE 2:** Understand how to select a good variety, where to source coffee seeds and how to manage seedbed.
- **OBJECTIVE 3:** Comprehend how to Prepare and manage the Nursery bed for producing healthy coffee seedlings

MATERIALS:

- River sand (sieved and dried)
- 5 mm mesh for sieving
- Blue sheets for drying sand
- Carpentry materials (wooden planks, nails, hammers, etc.)
- Tools for land preparation (hoes, shovels, rakes)
- Watering cans

TIME	CONTENT OUTLINE
	<p>PRE-TRAINING PREPARATION:</p> <ul style="list-style-type: none"> ▪ REMIND the Cooperative to choose the appropriate coffee variety according to the region agronomic conditions and acquire enough seed beans of coffee with good quality. ▪ LOOK for a suitable place for seedbed and nursery ▪ GATHER all the required materials at least two weeks before the training mostly the river sand ▪ ENSURE the budget availability for managing coffee nursery bed in 10 months <p>Prepare a list of materials and equipment needed:</p>



	<ul style="list-style-type: none"> • River sand (sieved and dried) • 5 mm mesh for sieving • Blue sheets for drying sand • Carpentry materials (wooden planks, nails, hammers, etc.) • Tools for land preparation (hoes, shovels, rakes) • Watering cans • Protective covers (e.g., shade nets) • Budget for labour, particularly for carpenters and land preparation workers. Procure all materials in advance to ensure timely preparation.
5'	<p>OPENING</p> <p>INTRODUCTIONS</p> <ul style="list-style-type: none"> ▪ Instructor ▪ Participants ▪ Guests <p>LOGISTICS Set ground rules for training.</p> <div style="background-color: #fff9c4; border: 1px solid black; padding: 5px;"> <p>ACTIVITY: Icebreaker Select an icebreaker that is appropriate for your audience.</p> </div>
10'	<ul style="list-style-type: none"> ▪ OBJECTIVE 1: Understands the importance of the seedbed and a good time to set it up <p>The good coffee beans to be used as seeds are prepared by RAB</p> <p>Ask: How to determine the Size of Seedbed?</p> <p>Answer:</p> <p>To determine the size of your seedbed, you need to know the number of seedlings you want to produce. Here's the calculation method:</p> <ul style="list-style-type: none"> - 1 kg of parchment coffee produces approximately 2,200 seeds. - Each coffee bean is about 1 cm in size spaced at 5cm. so one seed needs 5 square cm. <div style="display: flex; align-items: center;">  <p>For example, if you want to produce 22,000 seedlings, you will need 10 kg of parchment coffee (22,000 / 2200 = 10 kg). Considering spacing and optimal growth conditions, calculate the area required:</p> </div> <p>$=22,000 \times 5 \text{ cm}^2 = 110,000 \text{ cm}^2 = 1100 \text{ m}^2$</p>



	<p>Ask: why do we need to set up a seedbed?</p> <p>Answer: The growth and yield of coffee trees are greatly influenced by the quality of management for several months after sowing. Appropriate management of oxygen, moisture and sunshine will accelerate seedling growth and increase yield. Therefore, preparation of a good seed bed is important.</p> <p>Ask: What is the best time to set up the seedbed?</p> <p>Answer: September- October (Seed sowing should be done in rainy Season)</p>
10'	<ul style="list-style-type: none">▪ OBJECTIVE 2: Understand how to select a good variety, where to source coffee seeds and how to manage seedbed. <p>1st Land levelling and Preparation</p> <p>Choose a well-drained, flat area for the seedbed. Follow these steps:</p> <ul style="list-style-type: none">- Clear the area of all vegetation, stones, and debris.- Level the land using hoes and rakes.- Mark the boundaries of the seedbed according to the calculated size. 
50'	<p>2nd River Sand Preparation</p> <p>Sieving: Use a 5 mm mesh to sieve the river sand. This removes stones, weeds, and other unwanted materials.</p> <p>Drying: Spread the sieved sand on a blue sheet and dry it under the sun for 14 days. This process kills bacteria and fungi that could harm the coffee seeds.</p>

Filling the Seedbed

- Dig a trench 20 cm deep.
 - Fill the trench with the prepared sand.
 - Build wooden frames around the trench, extending 40 cm above the ground level.
 - Fill the above-ground portion of the frame with the prepared sand.



Benefits of Sand Seedbed

- ✓ **Ensures Long, Straight Roots:** Sand allows seedlings to develop long, straight roots, which are essential for healthy plant growth.
- ✓ **Avoids Soil-Borne Diseases:** Using sand helps to avoid diseases caused by soil bacteria and fungi, providing a cleaner environment for seedling growth.

Ask: Why Can Coffee Seeds Grow Without Soil Nutrients?

Answer: Inside each coffee bean, there is enough stored energy to support the initial development of the embryo. This energy allows the seedling to grow and establish roots before it needs external nutrients. By the time the seedlings are ready to be transplanted, they will have developed enough to thrive in soil conditions.

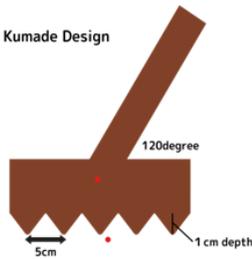
3rd Levelling the Seedbed Surface

- After filling the seedbed with prepared sand, use sticks to make the surface even because the uneven surface leads to inconsistent moisture levels and other environmental factors, causing non-uniform seedling growth.

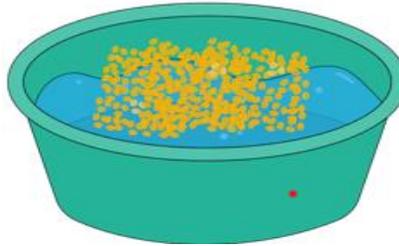
4th Preparing the Seedbed for Sowing

- If available, use a special tool called “Kumade” for efficient and uniform depth and spacing. (See the picture as reference)
- If “Kumade” is not available, use sticks to draw straight lines on the sand. The lines should be 1 cm deep and spaced 5 cm apart.

Kumade Design



Soak coffee seeds a day before
for seed sowing



- Soak the seeds in water overnight.
- Remove any floating seeds as these may have issues and are less likely to germinate properly.
- On the day of sowing, water the seedbed by covering it with jute bags to prevent unevenness caused by water pressure.
- Ensure that the entire sand bed is adequately wet by checking the moisture level.
- It's crucial to maintain proper depth and spacing for good seed germination and growth.
- Use “Kumade” or sticks to draw straight lines with a depth of 1 cm and spaced 5 cm apart.

5th Sowing the Seeds



- Place each seed in the furrow with the centre cut facing downwards, as the sprout will emerge from this cut.
- Ensure seeds do not overlap.
- Use your fingers to gently cover the seeds with sand from the middle of the lines to the furrow.
- Lightly flatten the surface without pressing down too hard to avoid compacting the sand.
- Cover the surface of the seedbed with jute bags.

6th Watering Schedule: After sowing, water the seedbed every morning and evening (twice per day) until germination starts, which typically takes around 40 days.

35'

- **OBJECTIVE 3:** Comprehend how to Prepare and manage the Nursery bed for producing healthy coffee seedlings

Ask: When shall we start to prepare the Nursery Space?

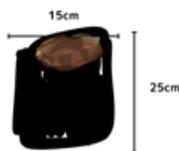
Answer:

During the 40-day germination period in the sand seedbed, prepare the nursery to accommodate the newly germinated seedlings. Do the following activities to ensure ample space and optimal conditions for transplanting:

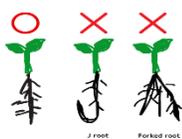
- Determine the number of seedlings to transplant.
- Each plastic pot should have a diameter of 15 cm and a depth of 25 cm.
- Calculate the total area required based on the number of pots.
- The nursery height should be between 1.8m and 2m to allow workers to water, weed, pest and diseases control in the seedlings easily.
- Choose a flat and well-levelled area with sufficient sunlight, a reliable water source, and protection from strong winds.
- Ensure the width of each seedling row is within 100-120 cm, allowing workers to reach from both sides for efficient weeding, watering, and fertilizer application.
- Maintain a service path of at least 60 cm between rows for easy access and comfortable working conditions.
- After 40 days from seed sowing, once the seedlings develop two or more true leaves, they can be transplanted into plastic pots.
- Fill the pots with the prepared mixture of soil, and manure, ensuring they are evenly packed without being compacted.

Plastic Pot Size

- a diameter of 15 cm
- a depth of 25 cm



- Transplanting from seedbed into pots should be done early in the morning when temperatures are low to prevent root drying, which can negatively affect growth.



- Inspect the seedlings' roots carefully before transplanting. Exclude seedlings with J-shaped roots or forked branching.

	 <ul style="list-style-type: none"> ➤ Using a wooden stake (or cassava stem), create a hole 2 cm in diameter and 10 cm deep (deeper than the seedling root length) in the center of the pot. Ensure the hole is straight and not inclined. <ul style="list-style-type: none"> ➤ Place the seedling into the hole straight, ensuring the roots do not tangle. The top of the sub-roots should be at the soil surface level of the pot. ➤ Firmly press the soil around the seedling using the stake ➤ Water the transplanted seedlings twice daily, morning and evening, for the first two weeks ➤ Apply NPK fertilizer twice before transplanting the seedlings to the farm <p>Use 4 grams of NPK per seedling during the rainy seasons, in March-April and September</p>
<p>5'</p>	<p>CLOSING:</p> <p>Review key learnings. Questions and answers Knowledge check Next step</p>