



Rwanda, Agronomy: Shade Management, Lesson Plan

TOTAL TIME: 2 Hours

AUDIENCE: Farmers

FACILITATOR: Farmer Trainers

LOCATION: Field (Demonstration Plot)

OBJECTIVES:

- **OBJECTIVE 1:** Describe the effect of full sun on a coffee tree.
- **OBJECTIVE 2:** Describe the benefits of shade trees.
- **OBJECTIVE 3:** Identify the characteristics of a good shade tree and some good species of shade tree.
- **OBJECTIVE 4:** Identify ideal shade levels for coffee.
- **OBJECTIVE 5:** Demonstrate how to plant a shade tree.

MATERIALS:

- 2 shade trees per demo plot (30cm tall)
- Hoe for digging hole
- 20L well composted manure or compost, if available
- Straight stick long enough to reach across the planting hole (60cm)

TIME	CONTENT OUTLINE
15 Min	<p>OPENING:</p> <p>INTRODUCTIONS:</p> <ul style="list-style-type: none"> ○ Instructor ○ Participants ○ Guests ○ Logistics – Review ground rules for training. <p>PREVIEW today’s training objectives:</p>



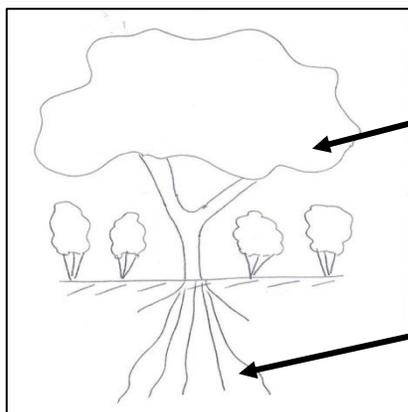
	<ul style="list-style-type: none">▪ This month we will learn about shade management in coffee. We will look at the importance of having shade in the coffee fields, what makes suitable shade trees and how to plant a shade tree. <div style="border: 1px solid black; background-color: #e0e0e0; padding: 5px;"><p>ACTIVITY: Icebreaker Choose an icebreaker which is appropriate for your audience.</p></div>
<p>15 Min</p>	<p>OBJECTIVE 1: Describe the effect of full sun on a coffee tree.</p> <p><i>Note to Trainer: Use as a question and answer session with farmers.</i></p> <p>ASK: How do you feel when you stand in the hot sun for a few hours?</p> <p>ANSWER:</p> <ul style="list-style-type: none">▪ Hot▪ Thirsty▪ Stressed! <p>EXPLAIN: Coffee trees can get very hot, thirsty and stressed if grown in full sun, especially during dry weather.</p> <p>ASK: If you do not have shade on your farm, what do your trees look like during the dry season?</p> <p>ANSWERS:</p> <ul style="list-style-type: none">▪ The leaves wilt▪ Leaves fall off and the coffee branches start to die back.▪ The coffee trees are more likely to get infested with thrips▪ The coffee trees may dry up completely if drought is prolonged. <p>SHOW: the picture of drought stressed and shaded coffee trees.</p> <div></div> <div></div>



	<p>ASK: The farmers which trees look healthier? DISCUSS</p> <p>EXPLAIN:</p> <ul style="list-style-type: none">▪ Your coffee trees feel the same as you in hot sun.▪ The coffee leaves and soil will get very hot.▪ Coffee in full sun needs more water as more water will be lost through evaporation from the soil and transpiration from the leaves.▪ The coffee trees are more stressed during dry period and likely to be infested by thrips. <p>ASK: Do you know where Arabica coffee originated? ANSWER:</p> <ul style="list-style-type: none">▪ Arabica Coffee evolved in Ethiopia in the forests under high levels of shade.▪ This means that Arabica coffee is naturally adapted to shade.▪ Growing your coffee under shade makes better use of your resources - light, water and soil.
<p>10 Min</p>	<p>OBJECTIVE 2: Describe the benefits of shade trees.</p> <p>EXPLAIN: We just learned that coffee prefers shade.</p> <p><i>Note to Trainer: Brainstorm responses with participants, before reviewing answers.</i></p> <p>ASK: What do you think are the other benefits of shade trees in your coffee? ANSWER:</p> <ul style="list-style-type: none">▪ Shade trees help to improve and maintain soil fertility:<ul style="list-style-type: none">○ Leaf fall from the trees increases the organic matter and adds nutrients.○ Shade tree roots stabilize the soil and prevent erosion in steep slopes.○ Some shade trees fix nitrogen (legumes).▪ Shade trees help to suppress weeds though reduced sunlight and natural mulch provided by leaf litter from the trees.▪ Shade helps to reduce evaporation and retain soil moisture, through lowering temperatures and reducing wind speed.▪ Shade trees attract more birds and insects which increases biodiversity and the number of different insects and predators that help control pests



	<p>and achieve better pollination and fruit set for coffee and other crops on the farm.</p> <ul style="list-style-type: none">▪ Shaded coffee farms have more stable microclimates and can withstand temperature and humidity fluctuations caused by climate change. <p>ASK: the farmers to list other benefits they can think of (such as honey, fuel, timber etc) DISCUSS</p>
<p>15 Min</p>	<p>OBJECTIVE 3: Identify the characteristics of a good shade tree and name some good species of shade trees.</p> <p>ASK: Do you think <i>Eucalyptus</i> is a good shade tree? Give reasons for your answer.</p> <p>ANSWER: No. <i>Eucalyptus</i> trees get very tall and use a lot of water. They would compete with the coffee for water and nutrients.</p> <p>ASK: What do you think are the characteristics of a good shade tree?</p> <p><i>Note to Trainer: Brainstorm responses with participants by asking some leading questions, e.g. should the tree be fast or slow growing?</i></p> <p>ANSWER:</p> <ul style="list-style-type: none">▪ Fast growing▪ Spreading canopy, tall enough to be above the coffee trees▪ Deep rooted so there is no competition for nutrients and water▪ Nitrogen fixing, if possible▪ Provides another benefit or income, e.g., a food crop such as bananas or avocado, or a timber/firewood tree.▪ Trees native to the country (indigenous) are better adapted to local climate and less likely to compete with the coffee trees.<ul style="list-style-type: none">○ Indigenous trees also encourage more birds and insects to eat the pests.○ Coffee buyers want to know you are looking after the environment so prefer you to plant indigenous trees.



Spreading Canopy

Deep roots

EXPLAIN: Trees native to the country (indigenous trees) are better adapted to local climate and less likely to compete with the coffee trees. They also encourage more birds and insects to eat the pests.

ASK: What do you think would be suitable shade trees if you need to plant shade for your farm?

ANSWER:

- Food crops such as banana or avocado
- Indigenous trees such as:
 - *Albizia sp.*
 - *Acacia sp.*
 - *Polyscias.*

ASK: farmers to suggest other native species that they think could provide shade for coffee? **DISCUSS**

Note to Trainers: Point out any of the tree species discussed that you see near to the training site.



<p>10 Min</p>	<p>OBJECTIVE 4: Identify ideal shade levels.</p> <p>ASK: Can coffee have too much shade?</p> <p>ANSWER: Yes. Very high levels of shade will result in:</p> <ul style="list-style-type: none">▪ Poor flowering▪ Reduced yield▪ Tall and weak stems, unable to support a heavy coffee crop. <p>EXPLAIN:</p> <ul style="list-style-type: none">▪ The ideal level of shade is 20-40%. (This means that 20-40% of the ground is shaded at any one time.)▪ You can manage shade by pruning the trees and removing plants, like Bananas, if the shade level is too high. <p>ASK: How do you space shade trees for an ideal level of shade?</p> <p>ANSWER: Depends on the tree species size:</p> <ul style="list-style-type: none">▪ Bananas should be spaced about 5-6m apart on a regular grid, keep at most 3 stems, and systematically replace with indigenous shade trees over a period of time▪ Trees such as Albizia and Acacia should be spaced about 8-9m apart in a regular grid.
<p>35 Min</p>	<p>OBJECTIVE 5: Demonstrate how to plant a shade tree.</p> <p>EXPLAIN:</p> <ul style="list-style-type: none">▪ The spacing of shade trees depends on the size of the tree species and the size of area without shade.

ACTIVITY: Planting a Shade Tree

DEMONSTRATE how to plant a shade tree following the steps below:

Steps to plant a shade tree:

Note to Trainer: Don't read these steps to the farmers but demonstrate and explain what you are doing.

1. Select a healthy seedling. Ideal size 30cm+
2. Dig the planting hole. This should be 40cm square.
3. Mix 10L of well decomposed manure/compost with the soil from the hole and back fill the hole half way, lightly compressing the soil in the hole.
4. Cut the bottom 2cm off the tree poly-pot with a sharp razor, to remove any roots that are pot-bound.
5. While the tree is still in the pot place the tree in the hole, adjust the depth of the soil in the hole so that the soil level in the pot is level with the ground level. Place a stick across the hole to judge this.



Diagram 1: Planting Depth

6. Once the depth of the hole is correct slit the side of the pot with a razor blade and remove the pot without disturbing the roots.
7. Place the remaining soil/compost mixture around the sides of the root ball and press firmly in place, making sure the tap-root is not bent.
8. Mulch the tree well, keeping the mulch at least 4cm from the tree trunk to prevent termites.
9. Water the tree well.



15 Min	<p>CLOSING</p> <p>Review key learnings.</p> <div style="border: 1px solid black; padding: 10px;"><p>ACTIVITY: Knowledge Check: <i>Use review questions to check for understanding providing corrective guidance as needed. Ask participants the following questions:</i></p><ul style="list-style-type: none">▪ What happens if you grow coffee in full sun?▪ What are some of the benefits of shade trees in coffee?▪ Which are some good shade trees for coffee?▪ What is the recommended shade level in the coffee farm?</div> <p>QUESTIONS AND ANSWERS</p> <p>NEXT STEPS</p> <ul style="list-style-type: none">▪ THANK the farmers for coming to training.