Rwanda Agronomy: Nutrition, Lesson Plan

TOTAL TIME: 2 Hours

AUDIENCE: Lead farmers, Field officer and cooperative staff

FACILITATOR: Cooperative manager

LOCATION: Classroom and training plot

OBJECTIVES:

- **OBJECTIVE 1: Farmers know the importance of good nutrition and can distinguish between a well fed and poorly fed coffee tree.**
- **OBJECTIVE 2: Farmers know that different nutrients are required for a well-fed tree.**
- **OBJECTIVE 3: Farmers know how nutrients are used up and how to identify which nutrients are required.**
- **OBJECTIVE4: Farmers know different ways of feeding a coffee plant.**
- **OBJECTIVE5: Farmers know the nutrition program for their specific Sector.**
- **OBJECTIVE6: Farmers can demonstrate how to apply NPK correctly and at the right rate.**

MATERIALS:

- Enough NPK to be used on demonstration plots
- Sample measures for NPK 100g (22:6:12+S)
- Plastic cups for making NPK measures
- Marker pen to mark measures.
- Scissors to cut measures.

TIME	CONTENT OUTLINE
10Min	**OPENING:** **INTRODUCTIONS:** ○ Instructor ○ Participants ○ Guests **REVIEW:** The last training by asking the farmers some questions. **REVIEW: Training Objectives:** ▪ This month we will talk about Coffee Nutrition and discuss the importance of good nutrition in producing coffee crop of high yield and quality.

	▪ Specifically, we will talk about: ○ The importance of a balanced nutritional program, ○ The specific fertilizer program for your local soils ○ How to apply fertilizers at the correct rate? ○ Finally, everyone will have the opportunity to apply NPK to the coffee. **ACTIVITY: Icebreaker** Choose an Energizer which is appropriate for your audience.
10Min	**OBJECTIVE 1: Farmers know the importance of good nutrition and can distinguish between a well fed and poorly fed coffee plant.** **ASK**: Why is it important to feed a coffee tree well? **ANSWER:** ▪ Increases yield and quality of coffee and therefore income ▪ Encourages good and healthy tree growth ▪ Helps to resist diseases such as leaf rust and pests ▪ Reduces biennial bearing – the alternate years of high and low crops - so that you get a good crop <u>every</u> year. **ACTIVITY: Well-Fed Tree** a) SHOW the picture of well-fed and poorly-fed trees. b) ASK farmers to raise their hands to show which they think is the well-fed tree. c) ASK: What are the differences between the well- and poorly-fed trees? d) DISCUSS.

	 *Picture of poorly fed (Left) and well fed (right) coffee trees*
10Min	**OBJECTIVE 2: Farmers know that different nutrients are required for a well-fed tree.** **ASK**: How would you feel if you only ate banana every day for one year? **ASK**: How would you feel if you ate banana with meat and vegetables, and some fruit? **ANSWER:** ▪ You feel better and will be healthier on a mixed and balanced diet. **EXPLAIN**: ▪ Coffee trees are just like people, they need more than just one type of food to be well-fed, healthy, and productive. ▪ The coffee tree feeds on the nutrients in the soil, and feeding coffee just on nitrogen based fertilizers, such as Urea and CAN, is like feeding people only on banana.
15Min	**OBJECTIVE 3: Farmers know how nutrients are used up and how to identify which nutrients are required.** **ASK**: How can nutrients be taken out of the soil? *Note to the Trainer: Brain storm with the participants then review the answers*. **ANSWERS:** ▪ **Producing a coffee crop.** Nutrients are used up to produce the coffee beans, these are then taken out of the field in the beans and pulp when you harvest. ▪ **Leaching of nutrients.** Nutrients are washed out of the root zone deep into the soil by heavy rains.

- **Erosion of the top soil.** Top soil contains the nutrients that are most easily available to the feeder roots, if your soil is washed away the nutrients are lost.
- **Natural deficiencies.** Soils may already be deficient in some nutrients especially if they have been farmed for many years.

ASK: How can you know which nutrients your coffee trees need?

ANSWERS:

- Sometimes if a plant lacks a nutrient, the leaf will change colour or shape.

EXPLAIN:

- Like a person plants can also look sick.
- Nitrogen and Zinc/Boron are 2 common deficiencies seen on coffee leaves.

SHOW: the photographs and leaf samples of Nitrogen and Zinc/Boron deficiencies.

ASK: Have farmers seen leaves like these on their trees?

DISCUSS



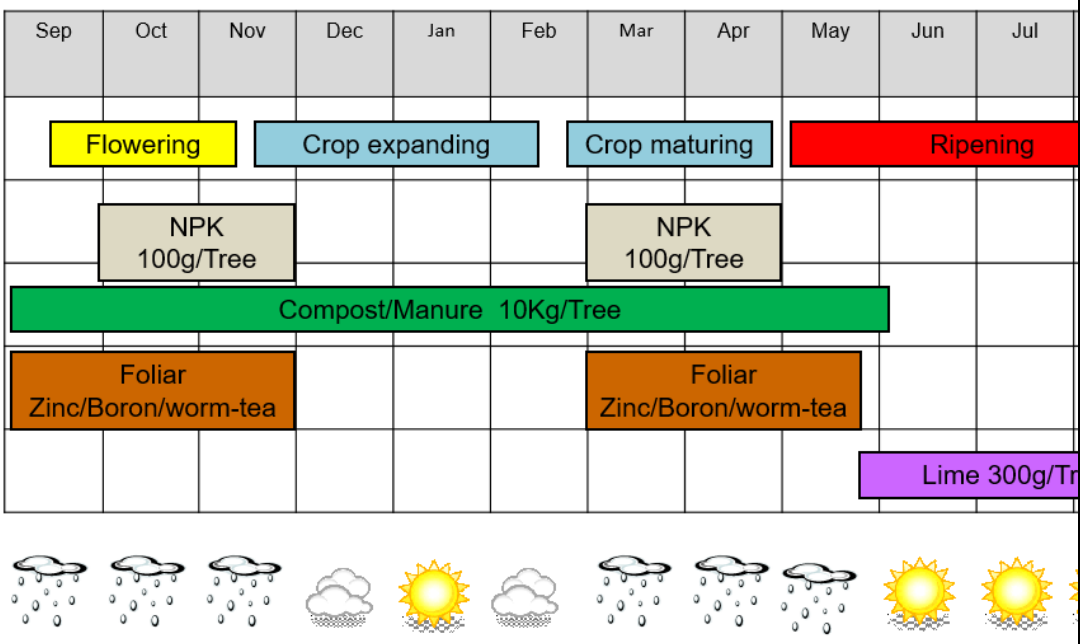
Picture of Zinc/Boron (left) and Nitrogen (right) deficiency

EXPLAIN:

- Nitrogen deficiency is commonly seen as the crop matures and ripens. Leaves turn yellow.
- Zinc/Boron deficiency is seen anytime of the year, the young leaves will be narrow and the veins are dark green but the leaf yellowish.

ASK: How else can you tell what nutrients the coffee tree needs?

	ANSWER: ▪ The best way to know what nutrients and fertilizers a coffee tree needs is to take a sample of your soil and coffee leaves and have them analysed for nutrient content. **EXPLAIN**: ▪ Samples of soil and leaves are taken to a laboratory where they are analysed and the results are interpreted by an expert who produces a nutrition program based on what is found in the soils.
10 Min	**OBJECTIVE 4: Farmers know different ways of feeding a coffee plant.** **ASK**: A coffee tree can't eat food like you and I, so how do we feed a coffee tree? **ANSWERS**: **1.Through the roots:** ▪ Most of the feeder roots of a tree are under the tree canopy. ▪ To take up nutrients applied to the soil, the roots need to be actively growing and the soil needs to be wet. ▪ Soil applied fertilizer should only be applied once there has been about 2 weeks of rain. **SHOW**: Farmers where the feeder roots are by drawing a circle under the tree with a stick as shown below:  *Location of feeder roots under the tree canopy* **ASK:** What is an example of a nutrient/fertilizer that is applied to the soil and taken up through the roots? **ANSWER**: NPK

	2. Through the leaves: ▪ Small doses of nutrients can be fed to the coffee plant through the leaves, these are called foliar feeds. ▪ Some nutrients, such as Zinc and Boron, are easily absorbed by the leaves, but not by the roots, so should be applied as foliar sprays. ▪ Soil moisture is not required for foliar feeds but the trees should not be sprayed if it is hot and dry.
20Min	**OBJECTIVE5: Farmers know the nutrition program.**  **EXPLAIN:** ▪ This program will provide the nutrients your coffee trees need to produce a good crop, will start to balance the soil and add any deficient nutrients. ▪ It should be used for the entire year **EXPLAIN: The program will use:** **Composted manure or compost.** ▪ Compost adds organic matter which helps the soil hold nutrients and moisture.

	▪ Compost provides Nitrogen, Potassium and Phosphate and micronutrients. Remember coffee pulp when composted makes great fertilizer, either compost at home or collect from your local wet mill. ▪ 1 Basket (20L bucket) of compost/composted manure should be used per coffee tree every year during the rains. **NPK** ▪ NPK contains Nitrogen (N), Phosphorus (P) and Potassium (K). All of these are needed for a good coffee crop. It should also contain Sulphur. ▪ NPK should be applied twice a year with the rains in March /April and October/November. The best time to apply NPK **is 2 weeks** after the start of the rain, when the tree is growing actively. ▪ Feeding coffee more than once a year is important. o Just like people (2-3 smaller meals/day versus 1 meal/day), coffee prefers to be fed a smaller amount a few times a year rather than a large amount once a year. o NPK can be lost by leaching and wasted if you apply a lot at once. o Apply NPK 22:6:12+3S in October-November, and NPK 17:17:17 in March-April. **Foliar feeds of Zinc and Boron /worm tea** ▪ Both zinc, boron and worm tea are required in small amounts but are very important for leaf and cherry development. They are applied to the leaves as a foliar spray. ▪ Ideally zinc, boron and worm-tea need to be applied twice a year. The first application at the start of the rains and flowering the second during berry expansion, depending on the main season. Foliar fertilizers should not be sprayed if the trees are stressed due to lack of rain. **Lime** ▪ All areas require lime ▪ Lime adds Calcium to the soil, and conditions the soil, making many other nutrients available for uptake by the coffee plants. ▪ Lime is a cheap product. ▪ Lime is applied during the dry season so we will learn more about lime after the rains.
30 Min	**OBJECTIVE6: Farmers demonstrate how to apply NPK correctly and at the right rate.**

ASK: How do you usually apply fertilizer:

DISCUSS. Do farmers broadcast?

ASK: How can you apply the right rate of fertilizer per tree?

ANSWER:

- Using a calibrated measure that delivers exactly the right rate of fertilizer.
- Place the fertilizer under the tree and not all over the field.
- This ensures the right rate of fertilizer gets to each tree, prevents waste and saves money.

EXPLAIN:

- We have made a measure for 100g NPK 22:6:12+S using scales.
- You can use this to make other measures.

ACTIVITY: Demonstrate How To Make an NPK Measure:

a) FILL the 100g measure with NPK and level.
b) POUR the NPK into another plastic cup.
c) MARK the level of the NPK on the cup with a pen.
d) POUR out the NPK and cut the cup along the mark you made with the pen. This should now measure 100g of NPK.
e) TEST by filling with NPK from the first measure.

REMIND: Farmers that the ideal time to apply NPK is about 2 weeks after the start of the rains, at this time the leaves and roots of the tree are actively growing and the fertilizer will be taken up fast.

	ACTIVITY: Applying NPK a) DEMONSTRATE how to apply fertilizer correctly using the following steps; EXPLAIN what you are doing: 1. HAND-PULL any weeds and remove mulch from under the coffee tree canopy. 2. FILL the measure with NPK and level. 3. APPLY NPK evenly under the tree canopy, make sure it is applied on all sides of the tree, leave about 20cm from the trunk and apply as far as the edge of the tree canopy. *Note: For trees that have been rejuvenated apply where the canopy would have been before rejuvenation.* 4. COVER with mulch. b) DIVIDE the farmers into applicable groups. c) GIVE each group a measure and a row of 8 trees to apply NPK. Ask them to follow all the steps you have demonstrated d) VISIT each group to give feedback and guidance. e) BRING all the groups back together. DISCUSS the activity, was applying fertilizer challenging or easy?
15Min	**CLOSING:** **REVIEW KEY LEARNINGS:** **ACTIVITY: Knowledge Check** ASK participants the following questions: *Note to Trainer: use review questions to check for understanding providing corrective guidance as needed.* ▪ Why is good nutrition important? ▪ Is it OK to feed a coffee tree with Nitrogen only? ▪ How much NPK should you apply in October? ▪ When is the best time to apply NPK? **QUESTIONS AND ANSWERS** **NEXT STEPS:** ▪ THANK the farmers for coming to training.