



COFFEE FARMING TOPIC 06: INTERGRATED PESTS AND DISEASES MANAGEMENT

Integrated Pests and diseases management is an essential activity in coffee farming to increase both the quantity and quality of production. The main diseases found in Rwanda include coffee rust, leaf blight, and coffee berry disease, and coffee is also affected by various pests, the most important being the coffee berry borer, leaf miners, and aphids. Disease and pest control requires farmers to properly manage their coffee fields through practices such as weeding, pruning, mulching, fertilization, and the application of appropriate pesticides.

A disease is a negative effect on the functioning of the parts of the coffee plant resulting from the harmful activity of microscopic organisms that cannot be seen with the naked eye, such as fungi, bacteria, or viruses, causing damage to leaves, branches, or fruits and reducing coffee yield and quality.

Pests, on the other hand, are insects or animals that visibly damage parts of the coffee plant—such as ants, mites, coffee berry borers, and caterpillars—thereby causing losses.

Scouting coffee plantation

Scouting is monitoring the field assessing pest, diseases and beneficial insects in coffee plantation. It is very important because it helps to detect diseases and pests at an early stage, prevent their spread throughout the entire farm, and reduce losses in yield and coffee quality. This enables the farmer to make decisions based on accurate information and to apply treatments only where necessary, thereby reducing the cost of pesticides and protecting the environment. Regular assessment also helps coffee plants maintain good health, produce high and quality yields, and increases the chances of accessing better markets and achieving sustainable profits for the farmer.

Visiting and monitoring coffee trees in the field is done by walking through the entire farm and inspecting selected trees from different sections in order to understand the overall condition of the plantation. For each selected tree, the farmer checks for pests such as antestia bug, coffee berry

borers, as well as disease symptoms like leaf rust and coffee berry disease. At the same time, the presence of beneficial insects such as ladybirds, spiders, praying mantises, parasitic wasps, and other predators is recorded, as they help control harmful pests through biological means. All observations should be carefully recorded, including severity and distribution, to support timely and appropriate decision-making in managing pests and diseases.

Diseases and Pests Commonly Found in Coffee

<Pests>

1) Scales and mealbugs



- Scales and Mealbugs are small insects that chew on the branches and leaves of young coffee plants, making them weak. They suck the sap from the coffee, causing the tree to lose vigor.
- Apply treatment selectively: If these insects are very numerous in your field, mix cooking oil with liquid soap (such as Teepol) and apply only where the insects are present. This will not kill

the beneficial insects. A recommended mixture is 100 milliliters of oil and 50 milliliters of soap in 16–20 liters of water, use of natural predators (like ladybugs)

2) Coffee berry Borers



In Rwanda, this pest primarily affects the Western Province, especially along the shores of Lake Kivu. The coffee berry borer is black in color and lays eggs inside the coffee berry, entering through the tip of the berry. The larvae hatch from the eggs and feed on the berry, leaving only the husks behind. The coffee berry borer reduces both yield and quality, causing losses for the farmer. The



adult borer is black. Pesticides cannot effectively control borers inside the berries, because they are protected within the fruit. Instead, these chemicals often kill beneficial insects.

➤ **Methods of controlling coffee berry borer**

a. Farm management

- ✓ Visit the farm regularly to check for small black holes surrounded by frass on the tips of coffee berries or small black beetles inside the holes, then harvest the affected berries and burn them.
- ✓ Harvest all prematurely ripened coffee cherries and destroy them far away from the farm to stop the spread of the coffee berry borer.
- ✓ Intercrop coffee with shade trees such as *Alnus*, *Calliandra*, and *Leucaena* to encourage the multiplication of insects that feed on the coffee berry borer (farmers' friends)
- ✓ Collect all coffee berries infested by the coffee berry borer and destroy them far away from the farm to prevent further spread
- ✓ Prune your coffee trees between June and August, removing all suckers from each coffee tree.

b. Use traps

- **Do not use pesticides.** These will not be effective on berry borer, since it lives inside the berry. The pesticides will kill other beneficial insects.



Using a 1-, 2-, or 5-liter plastic bottle, paint it red and cut three windows in it. Inside, place a smaller bottle containing alcohol, local brew (such as beer), *ubushera*, or *urwagwa*.

- Tie a string to the small bottle and suspend it inside the larger bottle.
- Pour water into the large bottle so that it surrounds the small bottle containing the alcohol.

- Make a hole in the cap of the large bottle and pass the string attached to the small bottle through it. Then tightly close the large bottle, leaving the string visible at the top.
- Hang the bottle trap on a tree branch at a height of 1–1.5 meters.
- Place one trap for every 50 coffee trees.

The coffee berry borer is attracted by the smell and the red color, which resembles a ripe coffee cherry. After inhaling the odor for some time, it becomes intoxicated, falls into the water, and dies.

3) Coffee Stem Borer

This pest is found in all provinces of Rwanda, and older coffee trees are the most severely affected by the coffee berry bore



4) White Coffee Stem Borer



This pest is found in all provinces of Rwanda, and old coffee trees are the most affected by this insect. It is easy to identify, as it has a white color on its coat. It lays eggs on the berries of unclean coffee trees that have flowers. Within 10–12 days, the eggs hatch into small larvae that start boring into the leaves of the tree and penetrate inside the tree.

This pest causes damage starting from inside the coffee berry, attacking the coffee tree's roots, eventually causing the tree to dry up. The larva

(borer) takes 9–12 months to mature into the adult borer. During this entire period, it damages the coffee tree from the inside, releasing a powdery substance resembling sawdust, which falls to the ground. Once it becomes an adult borer, it digs a hole about 1 cm in size and continues to circulate in the coffee tree, where it lays eggs.

5) **Yellow coffee stem borer**

This stem borer is orange in color, lays eggs on the coffee tree, and then the larvae that emerge climb upward searching for soft spots to enter. They penetrate at the top of a small branch that is easy to pierce. They bore many very small holes along the tree from top to bottom. The powder that resembles sawdust can be found on the ground near the tree.



A leaf miner (or miners) creates a vertical tunnel on the coffee branch, starting above 50 cm from the branch and gradually moving along it. When these tunnels are opened, they release a powdery substance resembling dust. Whether caused by a single type or multiple types of miners, this results in the leaves turning yellow and falling off, although in some cases these symptoms may also be caused by other issues

➤ **Coffee Stem borer control**

- i. Controlling them is not an easy task, but the key is to properly care for the coffee farm, because these pests often target older trees that are not well-maintained.
- ii. **Tree hygiene (removing nests):** Use tools that do not damage the tree. This prevents pests from finding places to lay their eggs.

- iii. **Proper coffee management:** Fertilize and prune trees as they age.
- iv. **Trapping the larvae:** Insert the trap into a dug hole to eliminate them.
- v. **Shading trees:** Pests prefer hot areas; therefore, planting shade trees in coffee reduces these coffee pests.
- vi. Apply an insecticide using a cotton ball soaked in the chemical and insert it into a hole made in the coffee tree and the stem.

6) Antestia bug

Antestia bug is an insect with yellow, black, and white colors on its belly and back, and it has horns and legs that are mostly yellow. When this insect is crushed with a finger, it emits a strong odor. The *agasurira* is usually found in hidden places, such as under thick leaves, beneath foliage, or among many coffee berries. This insect also often lays its eggs under a coffee leaf



➤ How antestia bugs damage coffee

- **Feeding on coffee cherries:** Antestia bugs pierce young and mature coffee berries and suck the sap. This causes **black spots, shriveling**, and sometimes **premature fruit drop**.
- **Quality deterioration:** Their feeding introduces microorganisms that lead to “**potato taste defect (PTD)**”, a serious quality problem that affects the flavor and market value of coffee.
- **Damage to flowers and shoots:** When populations are high, antestia bugs may also feed on **flower buds and young shoots**, reducing fruit set.



- **Yield losses:** Continuous feeding weakens the plant and reduces both **yield and bean quality**.

➤ **Antestia control**

A) Good agricultural practices

1. Prune coffee trees regularly to improve airflow and sunlight penetration
2. Regularly **scout** for bugs and kill them during early morning when they are less active,
3. If you see **2–3 bugs per tree**, plan immediate control.
4. Protect beneficial insects like cameleons, parasitics wasps, praying mantis, etc

B) Pesticides application

Apply **environmentally friendly pesticides that control antestia bugs**. Pesticides should be applied **before harvesting** to avoid chemical residues being transferred to the coffee cherries during harvest. Before applying any pesticide, farmers are advised to **consult relevant experts (agronomists and extension officers)**, as the recommended pesticides for controlling antestia bugs **change from year to year**.

Current used pesticides controlling antestia bug

- Alphacypermethrin 100 EC: **This pesticide should be applied** at the right time, during the months of October–November, and uniformly. **Mix** 4.5 ml of the product with 15 liters of water, **and apply the solution to** 40–45 coffee trees.
- Pyrethrins (Agropy EWC Plus): **The application time is** the same as for alphacypermethrin. **Mix** 22.5 ml of the product with 15 liters of water, **and apply the solution to** 40 coffee trees.
- Use only selective insecticides approved for coffee,

<Disease>

1) Leaf Rust

Coffee leaf rust is caused by a fungus called *Hemileia vastatrix*. This disease occurs mainly during the dry season, especially in the short dry season and the long dry season, and is more common in low-altitude areas.

➤ Symptoms

It is identified by yellow powdery spots observed on the underside of the coffee leaf.



Leaves with leaf rust symptoms

Eventually, the affected leaves turn yellow and fall to the ground, causing the coffee branches to dry up. Coffee leaf rust is mainly spread by wind, but people and farm tools can also spread it when moving through the plantation, as the spores can stick to clothes and the body and be transferred to healthy leaves, causing infection. In general, when two (2) rust spots appear on a single leaf, the farmer should begin control measures.

➤ How to control leaf rust

A. Proper field management

- Coffee should be planted at a spacing of at least 2 meters between rows and 2 meters between coffee trees.



- The adequate and regular application of organic and inorganic fertilizers increases coffee tree resistance.
- Regular weeding and mulching also improve the resistance and vigor of coffee trees.
- It is advisable to remove suckers and prune excess branches so that pests do not find favorable breeding sites and so that pesticides can reach all leaves when spraying is necessary.
- Plant shade trees within the coffee plantation at the recommended density.
- It is recommended to plant disease-resistant (rust-tolerant) varieties, such as RAB C15.
- Apply vermicompost liquid fertilizer at a rate of 1 liter of fertilizer mixed with 10–15 liters of water. This solution should be applied to 30–40 coffee trees, early in the morning or late in the evening, using a sprayer that distributes the solution evenly. Avoid application when coffee trees are stressed by drought. In cases of severe rust infestation, the fertilizer may be applied every two weeks.

B. Use of fungicides

Before applying any pesticide, the farmer is advised to first seek guidance from responsible professionals (agronomists or extension officers), because fungicides used to control coffee leaf rust are rotated (changed) and not all products are applied in the same way.

Application of Copper Oxychloride:

- Mix 70 g with 20 liters of water and spray on about 25 coffee trees. Apply once per month, starting in September and continuing in October, November, December, and February, and also during March, April, and May when rainfall occurs.
- Application of Pyraclostrobin (Cabrio 250 EC):
- Apply 6 ml per 15 liters of water and spray on about 40 coffee trees.

Note: It is important to apply the pesticide on the underside of the coffee leaf.

2) Coffee berry Diseases

Coffee berry disease is a disease that affects coffee cherries and is caused by a fungus known as *Colletotrichum kahawa*. This disease is most severe in areas with elevations above 1,600 meters. Rainy and cold conditions greatly favor its development, allowing the fungus to spread rapidly and

infect many cherries. When this spread occurs during the harvesting period, the disease causes even greater damage, as it leads to premature drop of the coffee cherries from the tree



A picture of Coffee Berry Diseases

Symptoms of Coffee Berry Disease (CBD):

- This disease causes the coffee berry to turn **black, as if scalded by hot water**.
- Affected berries show **dark sunken lesions** and rot, sometimes turning completely black.
- These symptoms can appear on **berries, stems, and leaves**.
- It also affects **young leaves and shoots**.
- Leaves of infected trees may appear **curled**, flowers and buds may **wither on the tree**, and sometimes **branches die back**

➤ **Prevention and Management of Coffee Berry Disease (CBD):**

- Proper field management: Take good care of the coffee farm by pruning, weeding, applying fertilizer, and cutting the trees on time.
- Applying Oxychloride of Copper fungicide: Spray 7 to 14 times depending on the amount of rainfall. Use 140 g of the fungicide mixed with 20 liters of water to treat about 25 trees, repeating the application every 15 days. Applications should be done in September, October, November, December, February (when rains begin) and in March, April, and May (during peak rainfall).

- Applying Pyraclostrobin (Cabrio 250EC): Use 6 ml of fungicide per 15 liters of water to treat 40 trees.
- Consultation before spraying: Before applying any chemical, the farmer should first consult agricultural specialists (Agronomists or extension workers), because fungicides for CBD are rotated (alternated), and each chemical is not used in the same way.
- Timing of fungicide application: Fungicides should be applied before harvesting to avoid high chemical residues being present on the cherries at the time of harvest

3) Dieback

It is a disease called “Die-back”, caused by nutrient deficiency. It often affects coffee grown on poor soils, poorly managed trees, as well as mature coffee trees that do not receive sufficient fertilizer.

Symptoms:

It is recognized when the berries prematurely ripen (turn yellow) and then blacken, remaining stuck on the tree. The branches also turn black and dry out starting from the tips. This disease is called “Dieback.”



Symptoms of dieback

➤ Prevention and control of dieback:

- Plant coffee in good-quality soil and ensure proper cleaning of the area.

- Apply fertilizers appropriately and on time,
- Mulch regularly, and prune the trees properly and at the right time

Beneficial insects

Beneficial insects in coffee play an important role because they help naturally control pests that damage coffee, thereby reducing the need for excessive use of chemical pesticides. These insects, such as bees, ladybugs, and other beneficial species, feed on coffee pests, assist in pollinating various plants, and increase productivity, while also contributing to environmental conservation. Protecting and conserving these insects promotes healthy coffee plants, increases yields, lowers production costs, and ultimately provides sustainable benefits to the farmer

1) Chameleon



It eats many insects, including pests such as Antestia. It is a natural enemy of coffee-damaging insects. This helps reduce the use of chemical pesticides, making coffee farming more natural and environmentally friendly.

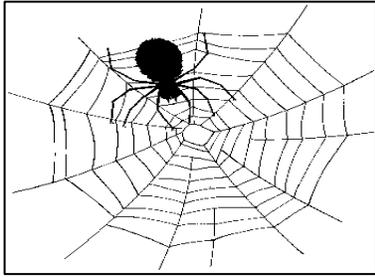
2) Ladybirds



- They are oval-shaped and have black and red markings (not orange).
- Both adults and larvae feed on pests, and they are often found together.
- Do not confuse them with harmful beetles.

Ladybirds are natural enemies of coffee pests, especially **aphids** (insects that suck sap from leaves), **mealybugs**, and other small insects that infest coffee. They consume these pests in large numbers, thereby reducing their population in the field, which helps protect coffee leaves and berries. This contributes to **reduced use of chemical pesticides**, protecting the environment and farmers' health, while promoting **biodiversity and sustainable coffee production**.

3) Spiders



- They eat many small insects.
- This provides coffee with natural protection, reducing the need for chemical pesticides, which helps protect the environment and the farmer's health, and contributes to maintaining ecological balance and sustainably increasing coffee yields.

4) Praying Mantis



- Eat pests such as Antestia.
- 100's of praying mantis come from 1 egg case.

5) Parasitic Wasps



- Tiny wasps that lay their eggs on the pest eggs. (They can't hurt you).
- Larvae feed on the pest eggs and kill them.
- Common on Antestia eggs. Parasitized

Antestia eggs will be grey in color and will hatch as wasps, while eggs that are not parasitized will be white in color and hatch as Antestia.

- Parasitic wasps are also common parasites of scales and mealy bugs.