

Integrated pest management: African rice gall midge

This module is directly linked to Module 20 and provides details about methods used to control an insect that is harmful to rice. In this module, insect management will be considered in an integrated way, which means that the control will not be based on a single technique but rather that different methods of control will be used. The choice of different methods and combining them in an integrated manner requires a good knowledge of the life-cycle of the insect. Various aspects of insect control were initiated in Module 20 and will be completed in this module. It must be made clear that use of insecticides usually demonstrates a lack of understanding of the biology of these insects. Use of insecticides should be avoided. Insecticides can be considered as poisons that not only kill the insects, but disturb the ecosystem as a whole. This is because most insecticides are not manufactured to target a specific insect, but can kill all kinds of insects, including beneficial ones (Module 20). This module focuses specifically on African rice gall midge, the insect that causes ‘onion tubes’ to appear in the rice crop (Reference 22).

- ❶ Recall the different types of attack by harmful insects.
- ❷ Review farmers’ knowledge and their practices.
- ❸ Introduce the basic principles of integrated pest management.
- ❹ Reconstruct the life-cycle of African rice gall midge.
- ❺ Discuss the methods for integrated management of African rice gall midge.



Learning objectives

At the end of this module, farmers will:

- Know the different methods for controlling harmful insects: chemical control and control through improved crop management practices using preventive and curative methods.
- Be aware that integrated and effective management of harmful insects must be based on a combination of these methods, and that the use of insecticides should be avoided.
- Be able to evaluate the nature, severity and economic importance of the damage caused in view of taking appropriate action (intervention).
- Be able to make rational decisions about insect control according to (i) the nature and severity of the attack, and (ii) the development stage of the rice plant and of the insect.



Procedure

1. Farmers and the PLAR-IRM team meet at the PLAR-IRM Center. The facilitator briefly reviews the previous module and invites farmers’ feedback. The facilitator asks if the farmers have put in place any new practice on their IRM fields.
2. One of the PLAR-IRM team members explains the learning objectives and procedures for the current module.

Module 21

Integrated pest management: African rice gall midge

3. Recall the main types of attack from harmful insects (Module 20). If necessary, the facilitator helps the farmers to complete the list:
 - Insects that cut or nibble the leaves.
 - Insects that enter the plant through the leaves and migrate down the stem.
 - Insects that enter the stem from the bottom or from the roots and migrate upwards.
 - Insects that suck the leaves' sap and thus transmit diseases from plant to plant (comparison with malaria).
 - Insects that attack and suck grains (sucking bugs).
4. The facilitator leads a discussion of farmers' knowledge and practices for controlling harmful insects and shows the diversity of knowledge and practices among farmers: for each practice identified, the farmers are invited to share individual knowledge and to be specific on the following points:
 - Is it a curative or preventive control method?
 - Is this practice targeting one specific insect or is it a rather a generalized intervention?
 - If necessary, the facilitator shows the difference between curative and preventive methods by explaining the treatment of a sickness like malaria: (i) treating with Quinemax after the patient has displayed some symptoms of malaria is a curative action, while (ii) avoiding mosquito bites by sleeping under a mosquito-net is a preventive action.
 - The facilitator draws a five-column table on a large sheet of strong packing paper to note the farmers' answers. The headings will be as follows:

Practice/knowledge	Curative	Preventive	General	Specific/targeted
...
...

- The facilitator asks the farmers to give their opinion on the importance and the efficacy of each practice.
5. The facilitator introduces the basic principles of integrated pest management by presenting the following elements (Reference 21):
 - The ecosystem as host to the rice plant, other plants, and insects (both harmful and beneficial).
 - The dangers of insecticides, which are poisons and which, in most cases, do not target specific insects but kill all kinds of insects (and other creatures), including useful ones.
 - The dangers of insecticides to human health.
 - The risk of limiting insect control to a single technique.

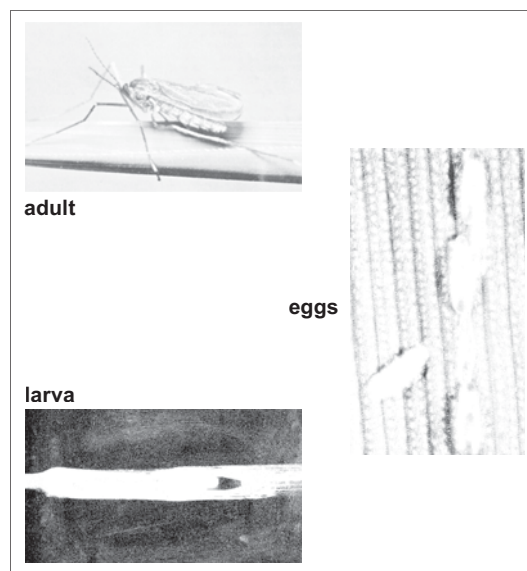
Module 21

Integrated pest management: African rice gall midge

- The efficiency achieved by combining several methods; and, moreover, the principle that it is better to prevent (preventive actions) than to cure (curative actions).
 - The need to thoroughly understand the behavior and biology of the insect in order to be able to make rational decisions.
6. The facilitator encourages discussion about the integrated management of African rice gall midge¹ (causing ‘onion leaves’ to appear in the rice crop), one of the main rice insect pests.

The life-cycle of African rice gall midge²

- The facilitator shows samples of rice plants presenting the symptoms of African rice gall midge attack.
- Briefly review the symptoms and the type of attack (Module 20). Distinguish between these symptoms and the symptoms of ‘dead heart’ caused by drought.
- One farmer is invited to find ‘the insect’ (Module 20); if necessary, the facilitator will help him/her.
- After isolating the larva from the stem, the facilitator shows a picture of the larva inside an ‘onion leaf’ and places the picture at the bottom of the board.
- Thereafter, the farmers deduce the origin of the larva and how it entered the plant.
- Then the farmers have to find where the eggs were laid and what happened to the eggs. The facilitator shows pictures of eggs and of the adult insect and places these pictures on the board, respectively to the right and directly above the picture of the larva.
- Next, the facilitator helps the farmers to describe what happens to the larva after it has eaten enough. In order to rest, it builds a home in which it hides and stays still before transforming itself into an adult flying insect. The facilitator shows the picture of the cocoon and places it on the board to the left of the larva.
- Then the facilitator shows, by drawing arrows between the different pictures, that the life-cycle of African rice gall midge is a four-stage cycle.
- After reconstructing the life-cycle of African rice gall midge, the facilitator helps the farmers to determine the duration of each stage and at which stage of rice plant development each insect stage occurs. The facilitator notes these answers on the board.

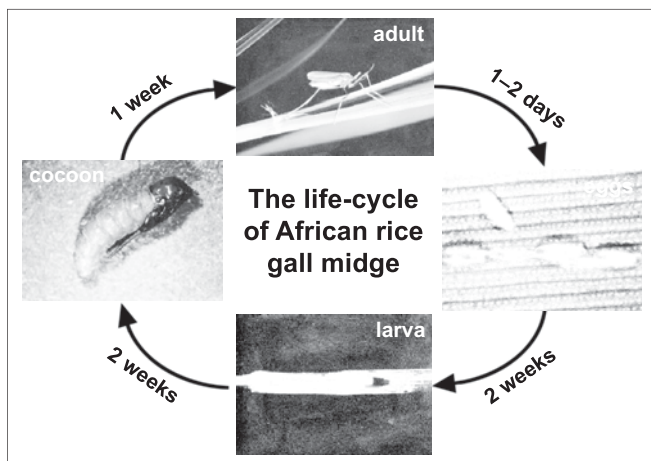


1. The facilitator or some farmers will bring some samples of rice attacked by gall midge.

2. The facilitator will be using representations of the insect, the larva, the cocoon, the eggs (*see also* Materials required).

Module 21

Integrated pest management: African rice gall midge



- The facilitator assists the farmers in evaluating the number of eggs laid by an adult female and hence shows the potential multiplying factor of 400 in a five-week period.
- If required, the facilitator gives more information about the insect's biology.

Control methods

- The facilitator encourages the farmers to think about the life-cycle of African rice gall midge, and asks the following questions:
 - How is it possible to interrupt the life-cycle of African rice gall midge?
 - Is it easy to attack the larva, the cocoon or the eggs?
 - Given the short life of the adult, is it easy to kill the insect?
 - What is the feasibility of using a curative method as compared to a preventive method to solve the problem?
 - How is it possible to prevent the adult insects from multiplying and thus from laying eggs?
 - the facilitator leads the following reasoning: if today one midge lays 400 eggs on a seedling in Farmer A's nursery (which was the first to be sown), after a month, there will be 400 new midges, of which 200 will be females. When Farmer B will be sowing three weeks later, the 200 females (from Farmer A's plot) can, in theory, lay 80,000 eggs. How could such a multiplication of midges be avoided? In general, the farmers rather quickly state that the solution lies in simultaneous sowing;
- Then the facilitator asks where the insects may survive when there is no rice in the field. If the farmers do not find the answer, the facilitator assists the farmers to understand that the insect can also infest some weeds, e.g. wild rice (*Oryza longistaminata*):
 - the facilitator assists the farmers in identifying ways to avoid a high population of the insect's adult stage (midges) at the beginning of the season. In general, the farmers quickly state that the solution lies in bund cleaning and regular weeding;

Module 21

Integrated pest management: African rice gall midge

- The facilitator assists the farmers in finding other ways to control African rice gall midge, e.g. treating the nursery with a low dose of insecticide three days before transplanting, appropriate water management, or synchronized sowing.
7. The facilitator introduces discussion on preserving beneficial insects.
 - He/she explains that certain weeds play host to beneficial insects, for example, *Paspalum scrobulatum*, which plays host to natural enemies of African rice gall midge. He/she identifies the plant and asks the farmers for the local name.
 - He/she elaborates with farmers the possible ways of preserving the plant:
 - They reflect on how to prevent putting fire in the farm, and thus preserve *Paspalum scrobulatum* plants;
 - They reflect on the danger associated with indiscriminate use of insecticides or herbicides, which could kill all insects including the beneficial ones, or kill plants including the host.
 8. Evaluation: the facilitator asks what the farmers appreciated (or did not appreciate), what they learnt, and what they intend to do with their newly obtained knowledge. The facilitator specifically asks which new ideas this module has generated and how farmers intend to put these into practise on their IRM fields.
 9. The facilitator asks a volunteer farmer to make a summary and conclude the session, and then invites farmers to the next session.



Time required

- Three hours



Materials required

- Strong packing paper and markers.
- Samples of rice plants manifesting the symptoms of ‘onion leaf.’
- Pictures on glazed paper representing the four stages of African rice gall midge life-cycle.

