19

Participatory pest analysis

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• Introduction

Making the principles of Integrated Pest Management (IPM) a reality in farmers' fields requires a methodology that enables farmers to decide whether or not to apply pesticides. Farmers must be able to assess the condition of an ecosystem, in order to make this decision. This requires more than just 'scouting', or assessing pest levels. Ecosystems are complex, and even very experienced local people or pest experts do not know everything.

Participation is required but so are skills and knowledge which are not necessarily available locally. This article describes how we are working with farmers, combining some of the principles of agroecosystem analysis with transects, ecosystem drawing, and group analysis, to enable farmers to make on-field decisions about applying pesticides.

The task of IPM

Our task is to train farmers to apply IPM in their own rice fields, thus minimising the use of pesticides (see Box 1). Following simplified instructions from a crop protection agency would not work. Pest levels vary greatly over small distances. Each farmer must know which beneficial insects and pests exist in her or his own field, and to decide themselves whether or not to apply pesticides.

But what do farmers need to be able to accomplish this? First, farmers need knowledge about the state of their field ecosystems. However, most farmers can identify no more than about ten pests and two or three beneficial inspects in their rice fields.

I have spoken with Indian farmers who sprayed pesticides to eliminate ladybird beetles, and Chinese farmers who sprayed because they thought there were too many spiders. They did not know that the more of these insects the better. Therefore, often outside skills and knowledge are necessary.

BOX 1

Good reasons to avoid using pesticides:

- pesticides kill beneficial predator and parasite insects which hold pest levels down naturally, pesticides induce pest outbreaks and thereby reduce crop yields.
- pesticides cost the farmer money which can be saved. Applying pesticides is heavy, time-consuming work, which can be avoided.
- pesticides are a health hazard, pollute the environment and destroy biodiversity.

Learning about the ecosystem of their fields means that farmers must improve:

- identification skills by careful observation and drawing;
- analytical skills by considering and discussing the complexity of ecosystem interactions;
- their judgement, by responding to questions after presenting findings and critically assessing other farmers' analysis; and,
- their understanding of pest-natural enemy relationships by asking and answering questions in peer groups.

Our methodology

In the FAO Inter-Country Programme for IPM in Rice in South and Southeast Asia, we set about developing a methodology that would allow farmers to gather information about

Source: PLA Notes (1997), Issue 28, pp.84–86, IIED London

what kinds of animals are present in their fields. They would learn to analyse that information to decide whether or not to apply pesticides, not with the objective of killing pests, but conserving beneficial insects. We usually work with a Farmer Field School of about 25 farmers and carry out the following steps. It should be noted that all farmers must participate in observing, drawing and reporting.

- Assemble farmers into groups of 4 or 5 (6 is too many, 3 too few);

- Have each group walk on a transect across a field (rice, cotton, soybean, it doesn't matter which kind) and ask each group to stop at a total of ten places, spaced so that they represent a transect across the entire field;

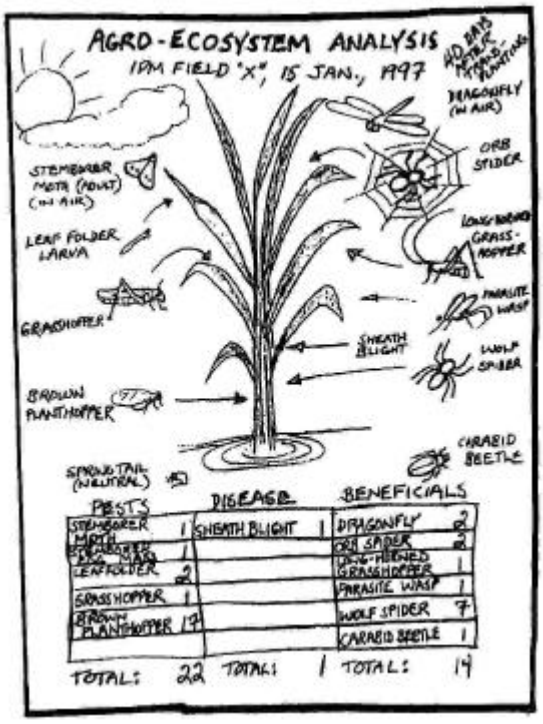
- At each stop, all group members should carefully look at one or a few plants (the number of plants at each stop depends on the size of the plants, which in turn, depends on the time of the crop/season) and observe the following aspects of the plant or plants:

    - All insects and other animals on the ground or on the plant (by part, such as stem, leaf, flower or panicle), and what the insects are doing (e.g., chewing leaves, jumping around, chasing other insects, flying past, crawling on the ground, eating tiny eggs etc.);
    - All disease on stems, leaves and fruiting parts;
    - Moisture in the soil or, if a rice paddy, level of water in the field;
    - Weeds; and,
    - Weather should also be noted: Sunny, partly cloudy, cloudy? Dry or humid? Hot or cool?;

- Each group should draw a picture of the plant(s) (see Figure 1) using a large sheet of newsprint and colour crayons (this is usually done using a plywood board in the field for support). The drawing should display the following:

    - The plant (e.g., a rice plant);
    - All beneficial insects (predators, parasites) are drawn on the right hand side close to where they appear on the plant (e.g., dragonfly in the air above the plant, a wolf spider at mid level on the stem, etc.);
    - All pests are drawn on the left hand side, close to where they appear on the plant (e.g., Brown planthoppers on the rice stem, leaf folders on the upper leaves, etc.);
    - All neutral insects which are neither pests nor beneficials in the ecosystem (e.g., mosquitoes, springtails) are drawn in the lower middle of the picture;
    - Diseases should be drawn on the plant itself, where they appear (e.g., sheath blight on the base edges of the leaves, etc.); and,
    - Each group should prepare a table at the bottom of the drawing showing the number of beneficiary insects by type, the number of pests by type, the number of neutral insects (those which are neither pests nor beneficial) by type and the number of diseased plants for each known disease.

Figure 1. Sample drawing from a rice field



Source: PLA Notes (1997), Issue 28, pp.84–86, IIED London

· Reflections from experience

In the Farmer Field School, we have used the principles of agroecosystem analysis, with the specific methods of peer group interactions and assessment, transects, observation, drawing and quantification of insect incidence, to train farmers as autonomous IPM practitioners. This specific combination of methods has enabled farmers to look sharply, analyse critically, and decide appropriately and timely. This minimises the inputs of harmful pesticides into the environment and food sources.

To conclude, there are several observations about the process we have developed. It is essential for the process to work successfully that some participants know something about the local ecosystem. The group should have access to *accurate* information about the area, either through a knowledgeable farmer, a biology teacher, local hunters, forest-product gatherers or crop protection agents.

It is also essential that people draw everything they can see. However, we have found that farmers may not see what they do not recognise, even though insect numbers may be quite high. Some farmers may even need spectacles to spot the tiny creatures! To encourage sharp observation, we sometimes offer small prizes for the group which records the highest number of observed insect types. We do not encourage using pictures from books to guide the drawing as they hinder the development of observational skills.

Active use of the drawings is central to success. The sub-group of four or five farmers presents its drawing and analysis to the others, explaining why it would (or would not) spray at that particular moment. This can be a slow process on the first occasion, but drawings will become increasingly accurate and discussion animated as time goes on. This process often produces many questions and leads people to challenge each other's analysis.

For example, the farmer trainees may ask: "Of the insects you drew, which are the natural enemies of stemborers, of the stemborer moth, or egg mass?", "What does a dragonfly eat? and how does it catch its prey?", "Why do you think it is unnecessary to control Brown Planthopper at the levels you found?". The discussion represents perhaps the most important opportunity for learning and critical thinking.

IPM is most effective if crops are observed weekly, as insect numbers change quickly. In a Farmers' Field School, we repeat this process of drawing and presentation weekly. This allows farmers to create a regular habit of field observation and demonstrates the evolution of the ecosystem over the cropping season.

This approach to examining an agroecosystem can be adapted to any crop or part of an ecosystem. The information collected through this process can be useful for ecosystem trend analysis and making decisions about resource conservation and land use. For example, local residents can undertake a study of their local forested area by carefully recording and drawing the ecology of that forest. Analysis of the ecosystem, focusing on those aspects that are critical to sustainability, can take place during the reporting back.

Other PRA methods could support this approach of analysing local resources and interactions, including: cropping calendars (to systematise cropping schedules and patterns), transect walks (focusing on land use planning or economic analysis) and trends analysis (to analyse changes in local environments).

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