Chinese rice farmers

The new IPM experts

The farmer training approach discussed here is FFS. The field schools run in the Chinese case study examined here involved some 25 farmers who met each week. Training took place in the farmers' own rice fields. In this supportive learning environment, local ecology and practices were discussed and the farmers' perceptions of their farm agro-ecosystems were developed further. This process of observation is known as agro-ecosystem analysis. The outcome of the farmers' weekly agro-ecosystem analysis became the basis of such decision-making as whether or not to continue relying on spiders and parasitic wasps to control rice pests.

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The FAO-IPM programme is based on a new understanding of rice field ecology. Experience in many countries has shown that insecticides actually cause more pests, and there is now a better understanding of the importance of beneficial insects and spiders in the rice ecosystem. Research has shown that the use of insecticides early in the season destroys the detritivore and plankton feeding insect populations which are the first food source for generalist predators such as spiders. A lack of generalist predators leaves the crop more vulnerable to pest population increases later in the season.

Four Principles of IPM

There are four principles central to IPM. First, to encourage the growth of healthy crops and to stimulate farmers to use the best possible agricultural practices. Second, FFSs should emphasise the importance of conserving beneficials: pesticides should only be used as a last resort. Third, crops should be observed every week and farmers should be guided in this during training sessions designed to improve their skills. Finally, farmers should become experts, their training empowering them to make crop protection decisions responsive to the needs of their crops.

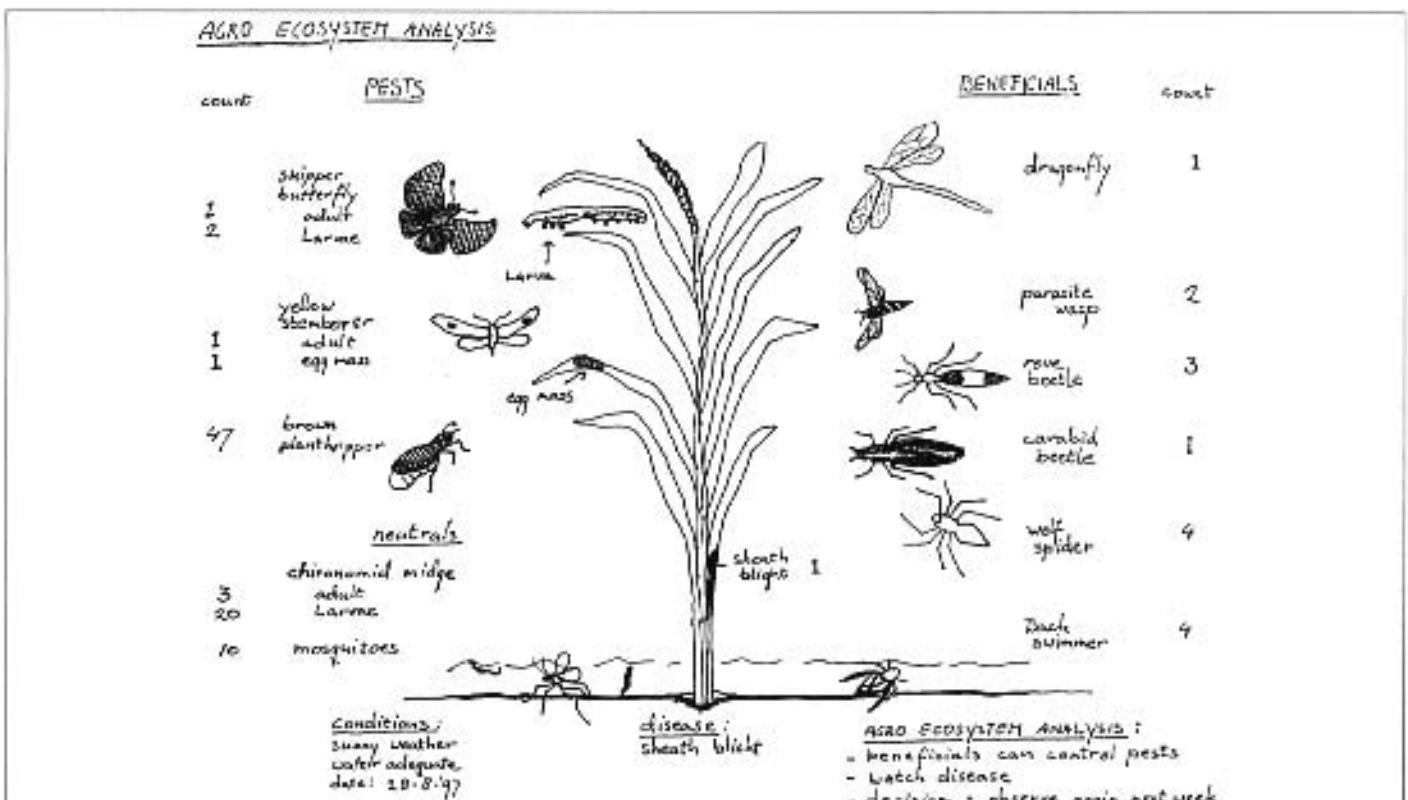
Farmers need to know which pests, diseases and animals are beneficial. In rice fields, beneficial species tend to outnumber pest species by about two or three to one. Farmers should also be able to identify neutrals - insects that are neither pests nor beneficials. Above all, they must be able to identify all these agro-ecosystem elements in their fields - not only on a classroom chart.

The agro-ecosystem of all crops changes in the course of the cropping season. In Sichuan, for example, very few stemborers are found early in the rice season, whereas thrips abound at this time. The proportion of these two pests changes as the rice grows. Parasitic wasps (beneficials killing leaf-eating caterpillars) are scarce early in the season, but become numerous in the second half. In the FFS, farmers acquire the skills needed to observe these changes as they occur from week to week.

This model was first used to train farmers in China in 1994. Twenty-five farmers who took part in the FFS in Wan Po Village, Sichuan, China, in 1995 were interviewed both before and after training and were observed during the weekly training sessions (Mangan, 1997).

Wan Po is situated in Meishan County, in the Red Basin of Sichuan, about two hours' drive south of Chengdu, the provincial capital. It has mild winters and very occasional snowfall. Summer temperatures rarely exceed 40°C. A single hybrid rice crop is grown in the summer, and canola or other crops are planted during the winter.

The Wan Po FFS farmers were organised into small groups of four or five people. Each group was named after some beneficial, for example, 'dragonfly', 'spider', 'parasitic wasp', or 'ladybird'. Every week, each group would complete an agro-ecosystem analysis of their FFS rice field. This consisted of examining approximately ten hills (clumps) of rice in a transect across the field. Observations included recording the types and numbers of insects, spiders and other animals, and collecting information



on disease, weather, general plant health, and water level. This information was then transferred to paper. Each group made a drawing of a rice plant on a large sheet of paper using crayons or coloured pens. The farmers drew in all the pests on one side of the plant and all the predators on the other. Neutrals were grouped together in one corner, and weather and water conditions were clearly indicated. Using this method, farmers were easily able to track the ratio of various pests to selected beneficials from week to week (Mangan 1997).

Group presentations

After entering the observations made in the rice field on their drawings, each group presented its analysis to the other farmers in the FFS. Observations, conclusions and the decisions they had made during the week were discussed. Every week a different member of the group was encouraged to be the presenter. The other group members contributed by answering questions. Initial shyness and reluctance soon gave way to confidence and self-assurance as the training progressed.

FFSs covered other activities besides agro-ecosystem analysis, the 'insect zoo' being an example. A potted rice plant was placed in a simple cage built by the farmers, and a specific number of a particular kind of pest - such as 100 brown planthoppers - were introduced into the cage. The pest's predators - five wolf spiders, for example - were also released into the cage. Each group of farmers was able to vary the pest/predator ratio. At the end of the week, the group opened up its insect zoo, and pests and predators were counted. The results, which usually demonstrate how effective beneficials can be in destroying pests, were then discussed with the members of the FFS. One of the results of the insect zoo demonstration was that farmers often started to experiment on their own and brought these informal results back to the group (Mangan 1997). Other games were designed to strengthen group cooperation and to helped farmers identify pests and recognise their habits.

Because the farmers applied what they were learning from the very first activity undertaken in the FFS, learning was functional. Farmers developed a deeper understanding of how the different components of the rice ecosystem interact, and this enabled them to make more informed decisions about their own field management.

Results of interviews

Twenty-five farmers in Wan Po were interviewed before and after FFS training. Questions were asked about beneficials, pests, neutrals, pest-predator relationships, the ecosystem in general, and the effects of pesticides used in the field.

Before the FFS, only 11 farmers knew the names of those insects that were pests, while 15 farmers, 60 percent of the total sample, could not give a specific example of any beneficial in the field. In pre-FFS interviews, 4 farmers said 'All insects are pests'. Before FFS training, of the 25 farmers interviewed, only spiders (7 farmers), dragonflies (4 farmers) and ladybirds (1 farmer) were known to be beneficial. In addition, before the FFS farmers could name very few insects individually. The total number of insects/spiders farmers referred to by name ranged from one (both times stemborers) to a maximum of nine. The average number of insects mentioned was four.

After training, all 25 farmers mentioned spiders, 23 farmers mentioned dragonflies, and 6 farmers mentioned ladybirds. Seven more beneficial insects were also named. Most importantly, farmers could identify these in the field. There was a 233 percent increase in the total number of beneficials named by the farmers after training. There was a 22 percent increase in pest species named. The lower percentage was due to the fact that farmers were already familiar with pest species, but had not known very much about beneficial species.

Before FFS training, 4 of the 25 farmers had said they had seen some predatory spider/insect attack another insect. After training, 14 farmers had seen some predatory spider or insect attack another insect, and 12 farmers described in detail what they had seen. The FFS had successfully focused farmers' attention on understanding how beneficials actively controlled pests.

Before training, 15 of the 25 farmers said it was beneficial to spray pesticides on their rice. After training, only 5 farmers continued to claim pesticides were beneficial, and 19 of the farmers explained pesticides were not good because beneficial insects/spiders were also killed in the process.

Before training, only one farmer was able to give an answer that showed no misunderstandings about the way pesticides worked. After training, 8 farmers provided answers that indicated they understood how pesticides killed insects, and another 9 farmers gave a correct explanation although they added a few facts that were not correct. A fundamental change in the understanding of the function of pesticides had taken place.

Only 5 farmers could give examples of neutral insects - those that are neither pests nor beneficials - before the FFS. The mosquito was the insect most named. After the FFS, 23 farmers were able to give correct examples, and most often these were mosquito larvae and ants. However, even after training, farmers still did not understand very clearly how neutrals functioned as a major food source for beneficials during the first third of the rice season, before populations of plant-eating pests began to increase. This was a concept that was not obvious to farmers.

Before FFS training, farmers were asked what would happen if all the spiders were removed from their fields. Only 6 farmers said that pest populations would increase. After training, all farmers said pests would increase if spiders were removed from their rice fields. After FFS training, only 7 of the 25 farmers thought it would not be beneficial to have insects in the field, but none of these 7 farmers said they would kill the insects they found there, even if this were possible. They recognised that there were predator and neutral insects as well as pests in their fields, and that a balance between them was necessary to maintain a healthy ecosystem and protect the crop. After training, only one farmer was unable to name more beneficials. No farmer said that all insects were pests. The number of insects/spiders named by the farmers in their post-FFS interviews ranged from 5 to 14. On average, ten kinds of insects were named.

These answers show the influence of the FFS on developing a concept of the pest-predator relationships in the field, and on extending farmers' understanding of how generalist predators protect crops. During the course of the FFS, the farmers' concept of the rice ecosystem, and their understanding of the function of beneficial insects in that ecosystem deepened considerably.

In the FFS, understanding and skills are developed through direct participation in specially designed situations. The careful arrangement of FFS activities in this educational experience strongly contributed to the formation of more scientific concepts. The FFS was effective because learning activities took place in a rice field - a familiar and learner-friendly environment.

The use of small groups of farmer trainees to make observations, and the role played by the FFS in challenging their conclusions, proved effective in bringing about change in farmer practices. Interviews conducted one year after the FFS had been held showed that the basic objective - to secure a reduction in pesticide use - had been achieved.

The application of these new IPM methods taught through Farmer Field Schools is environmentally sound and sustainable. The Farmer Field School is an efficient model for empowering farmers to reduce the use of pesticides. Wider application of this training approach benefits farmers economically - they save money because they buy less pesticides - and benefits the planet's environment. Everyone wins. ■

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References

- Kenmore, P. 1991. **How rice farmers clean up the environment, conserve biodiversity, raise more food, make higher profits: Indonesia's IPM - a model for Asia.** FAO Rice IPC Programme, Manila, Philippines.
- Kenmore, P., Gallagher, K., and Ooi, P. 1995. **Empowering farmers: experiences with Integrated Pest Management.** *Entwicklung und laendlicher Raum* 95(1):27-28.
- Mangan, Margaret S. 1997. **Rice ecosystem concepts of Chinese farmers before and after Farmer Field School training.** ME Dissertation, Murdoch University, WA, Australia.