From technological packages to ecological principles

One of the most cited programmes on Integrated Pest Management is implemented with FAO support in Indonesia. Successes in terms of number of farmers trained are well documented. The two authors have gone beyond that and studied the impact of all this at field and village level. Important changes are taking place because of the programme, but many other factors and interests also influence farmers. Good 'after-the-training' programmes are therefore urgently needed.

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Through a series of large-scale intensification programmes starting in 1968, the Government of Indonesia succeeded in intensifying rice cultivation. The programmes heavily depended on high-external-input technologies and included 'packages' of high-yielding varieties, fertilisers, and pesticides, all on heavily subsidised credit. A strong top-down extension system supported the promotion and utilisation of the inputs. Village Co-operatives (KUD) were established for input distribution and credit facilities. In 1983 Indonesia proudly announced self-sufficiency in rice. But this status was difficult to maintain, e.g. because of unprecedented outbreaks of brown planthopper in 1985-86. Following research findings showing the relation between such outbreaks and high pesticide use, the Indonesian government accepted the hazardous effects of increased pesticide use. It announced by a presidential decree (INPRES 3/86) a ban of fifty-seven broad-spectrum pesticides, and declared Integrated Pest Management (IPM) as the national pest control strategy. These measures, together with the gradual abolition of the high subsidies on pesticides, created a favourable climate for the implementation of IPM on a large scale. A National IPM Programme was launched in 1989, initially financed from funds originally targeted for pesticide subsidies.

Essentials of IPM

Experiences in several Asian countries over more than a decade have shown that IPM training and implementation programmes, using preset recommendations and top-down extension systems, are inadequate (Matteson et al., 1992). Therefore, the Indonesian programme developed an IPM approach using a strongly ecological perspective. The approach applies four principles: (1) grow a healthy crop, (2) observe the field weekly, (3) conserve natural enemies, and (4) farmers become IPM experts. In practice these principles imply strong emphasis on independent decision making by the farmers. With this as the core message, the conventional top-down farmer training approach is clearly not appropriate. Farmers have to be approached as active learners and managers of the ecosystem. Therefore, the IPM training strategy is based on the principles of non-formal education which seeks to empower people to actively identify and solve their own problems by fostering participation, self-confidence, and collective action and decision making.

Training

Training is conducted in so-called IPM farmer field schools, where learning occurs through experience with real field problems and through experimentation. Groups of twenty-five farmers meet in weekly sessions of four hours throughout one growing season (10-12 weeks). The trainer is a facilitator of this experiential learning process, not an instructor. Officials of the Directorate of Food Crops Protection in charge of pest surveillance receive a thorough,
more than one year, training in IPM and facilitation skills to become the field-school facilitators. Each training session consists of the following elements:

- field monitoring of special observation plots in small groups;
- agroecosystem analysis, in which drawings of occurring pests, natural enemies, and crop condition are made, and conclusions about crop status and possible measures are drawn together;
- presentation of the agroecosystem analyses and discussion;
- special topics dealing with locally occurring field problems;
- group dynamics exercises to enliven the school, and strengthen the training groups.

Main objective of the IPM farmer field school is that farmers learn to take pest management decisions based on their own observations and analyses. A second important objective of the field school is that farmer groups are stimulated to take collective action, which is indispensable for effective IPM implementation.

**Studying the impact**

The question is of course whether this alternative approach to training and extension is really effective. What is the farmer's response to all this? Two in-depth studies were undertaken to find answers to this question, one in 4 villages in Central Java (Van de Fliert, 1993), and one in 2 villages in West Java (Winarto, 1992). Although the agro-ecological situation is similar in both areas (see box), the West Java villages have been much more exposed to governmental rice intensification programmes. Since 1987 farmers have to implement the so-called 'ten-point technological package'. This includes e.g. seed and fertiliser (200 kg N/ha and 100 kg/ha of both P, K, and SA). The Village Co-operatives (KUD), promoted by the government, which has a role in supplying credit packages for obtaining these inputs, play also a more important role here than in the Central Java villages. It is not surprising, therefore, that response of farmers to the new IPM approach differs on some points.

**Favourable response**

The IPM farmer field schools in the study villages met with quite some success: attendance of the trainees in most FFS, not all, was over 90% during the whole season. Farmers were generally committed to participate. Favourable changes in group coherence and farmers' perceptions of the rice ecosystem and (chemical) pest control were evident from the third training session onwards. Farmers were generally excited about what they learned in the field school. Especially pest and natural enemy identification, the ecological importance of natural enemies, and analysis of costs and benefits in pest management were their favourite topics. The farmers highly appreciated the field-oriented and facilitation approaches that were applied in the field school. The many discussion opportunities left ample room for farmers' local knowledge to be integrated with the programme's guidelines. Some old farmers, for instance, reintroduced an indigenous practice of trapping rice seed bugs by burning paddy crabs. But as appeared in the first post-training season the FFS had left the farmers unprepared for an outbreak of the white rice stemborer. Because hardly any white rice stemborer had occurred during the training season, it had got very little attention in the 'learning-in-practice' trainings. Farmers' response to this attack in West Java varied greatly. Some really stuck to the no-pesticide way, and relied on mechanical control (handpicking, light-trap). Others combined this with spraying and/or use of carbofuran, while some stuck to the latter alone.
IPM makes a difference

Farmers who participated in the FFS generally found the training worth putting into practice. They did the regular field monitoring, as it can be easily combined with normal field-visits. This ultimately led to better informed decisions and to real reduction in pesticide use. To assess pesticide use of farmers who participated in the training it is important to compare it with that of non-IPM participants, as their own practices may be influenced by the weather, and the occurrence of certain pest outbreaks. Such comparison is possible as other cultivation practices are similar for both groups of farmers. IPM farmers really decreased their frequency of pesticide sprays during and after the training to a level consistently lower than that of non-IPM farmers. Consequently, IPM farmers' expenditures on chemical insect control decreased. The number of farmers not applying pesticides increased. IPM farmers also obtained higher yields than non-IPM farmers, which, in addition to lower pest control expenditures, resulted in higher returns of rice production. Additionally, there were less variations in fields (B) among (N) IPM farmers than among non-IPM farmers, indicating less riskier farm management under IPM regime. Timeliness and adequacy of various cultivation and pest control practices, resulting from better monitoring and decision making skills, seem to be most important in this respect.

Household budget support

In West Java, the IPM field school farmers also reduced their frequency of pesticide sprays, especially the preventive ones, even more drastically than their colleagues in Central Java since they started at a much higher level of pesticide use. One farmer reported that he could save Rp 25,000 (US $ 12.50), or 7% of the production cost for his 0.7 ha rice field. Although such savings are relatively small as compared to the total paid-out costs for rice production (pesticide cost amount to approximately 6% of total production costs), in absolute amounts they were tangible in the household budget of Javanese rural families. The first year, most farmers continued to apply granular pesticides (carbofuran) preventively, out of the habit of mixing these granules with fertiliser. They started to stop this only in the second year when prices of inputs further increased after abolition of government subsidies. In all villages some farmers felt insufficiently convinced and continued to give preventive pesticide applications. These farmers were usually the previously high-pesticide users with a risk-avoiding attitude. The reactions of farmers to the earlier mentioned outbreak of the white rice stemborer outbreak are very revealing. Quite a few panicked and fell back to the practices that were taught for years as the adequate means against pests. Others developed new strategies and experimented with combinations of what they had learned through the field schools and their own ideas and initiatives.

Peace of mind

Apart from reducing production costs (West Java), farmers found their improved understanding the major reward for participating in the IPM programme. Especially in Central Java they were excited to be treated really as independent farm managers, and not as 'passive-package-adopters' as before. Their enhanced self-confidence is probably the key to maintain and further develop the IPM crop management behaviour practices. As one farmer put it: 'Since I attended the IPM farmer field school, I have peace of mind. Because I now know how to investigate my crop, I do not panic any more when I discover some pest symptoms in the field.' The effects on farmers' practices as a result of IPM training are a start of a process that is set in motion. Something has changed in the minds of most farmers, which is, considering
the learning experience they have gone through, likely to develop by itself. Much, however, will depend on counter-pressures that exist at village level, hindering committed implementation of IPM.

Conflicting interests

The initial lack of success in reducing the use of granular pesticide (carbofuran) was in some villages caused by heavy promotion of carbofuran by the extension worker. As it happens some of the extension workers are at the same time agent for certain pesticide manufacturers or traders. For them it is a way to add to their salaries which alone are hardly enough to support a family. Another conflict between IPM farmers and local authorities occurred in West Java. The IPM group there applied for only partial credit from the Village Co-operative as they wanted to do without the liquid pesticides and foliar fertilisers (part of the standard KUD input package). Central government regulations allow in principle for such partial credit arrangements. However, the farmers did not succeed to convince the local KUD authorities and had to accept the complete package. Even buying it from their own cash was not allowed. They were simply told by the extension worker (who had been involved in the IPM field school as co-trainer!) that taking the complete credit package was obligatory, and that 'pesticides are still necessary to prevent pest attack, because you never know'. In fact the KUD managers and extension workers considered partial credit packages a trouble and a loss. This 'loss' mainly referred to their own personal commissions that would be cut if they did not sell the complete package.

Need for further support

The contradictory information received from the same institutions leave the farmers in a vulnerable position. The FFS, by nature of the approach, has not prepared them for outbreaks of 'new' pests. As one response, farmers start experimenting with different pest management strategies. Several did even comparative studies of different treatment options. But this was not without dangers as farmers started experimenting with kerosene as a substitute for carbofuran. In one village 20 farmers together "poured" 250 litres of kerosene into 35 ha rice fields. But to whom can they go to discuss all these issues, the conflicting guidelines, the 'new' pests, their experiments? Clearly there is a great need for post-training support to IPM farmers. The IPM Programme presently plans to pay more attention to these follow-up activities and to farmer-to-farmer training.

Conclusion

The farmer field school approach for training and extension helps farmers to change the way they look at the rice ecosystem. As a result, crop management practices become more sustainable. A more independent and responsible status, stimulated through empowerment processes in the field school, are an important contribution to support such change. Not all farmers trained had complete confidence in the new practices, which could be expected considering the long period they had been exposed to high-external-input packages and top-down extension methods. And interests of part of the conventional structures are still countering the impact of the IPM programme. Some changes in the institutional framework of the IPM Programme, less dependent on government structures, are probably needed to increase its effectiveness. And well planned post-training activities will be crucial to support farmers going the IPM way which brings them through such unknown and complicated land.
OUR VIEW

The experience of the Indonesian IPM Programme has shown that the use of pesticides in intensive rice cultivation can drastically be reduced. An (almost) non-use seems well feasible, considering the wealth of natural enemies in the rice ecosystem, especially in the long run when the ecological balance is not disturbed by pesticides. Intensive rice cultivation in Java has reached such high production levels (thus high output of nutrients from the ecosystem) that input of (additional) synthetic fertilisers, particularly nitrogen, is required. However, a reduction of fertiliser inputs through integration with organic measures and a more efficient use of synthetic fertilisers is feasible and seems a premise for the sustainability of intensive rice cultivation, especially for small, resource poor farmers.