Realities of educating resource poor farmers: Experiences in IPM implementation

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ABSTRACT

Resource poor farmers in Peru, Kenya, Zanzibar, Bangladesh, Cambodia, China, India, Indonesia, Philippines, Thailand and Vietnam have demonstrated that they can learn and generate knowledge that helped them become critical decision-makers. Using skills acquired in Farmer Field Schools, these farmers are capable of improving their efficiency in crop production. The experiences from educating resource-poor farmers have helped in understanding why a top-down approach in technology transfer has largely not delivered the potential benefits it promised. Drawing from the experiences in IPM implementation from three continents, it is shown that technology transfer, without non-formal education has led to crop failures in rice, vegetables, cotton and even tree crops such as oil palm. The Farmer Field School (FFS) approach of educating farmers addressed the inadequacy of farmers being experts in crop production. An Integrated Pest Management (IPM) farmer field school is a season-long learning experience. An adjacent crop is the classroom for participants. Farmers learn to carry out experiments to understand ecological concepts, leading to a better understanding of the agro-ecosystem. Often, farmers who undergo such an FFS are capable of understanding scientific concepts associated with IPM. Indeed, FFS provided an entry point for farmers to learn science and in the process to become more critical thinkers. Some of the lessons learned in implementing FFS in Asia include the following: 1) by providing farmers an opportunity to learn and achieve greater control over the conditions they face at field level, helped farmers to empower themselves, 2) farmers can educate other farmers, 3) farmers are effective organizers after they learn critical thinking skills in FFS, 4) Farmers can do science. It is also demonstrated that an FFS approach will help farmers address new technology such as genetically modified crops and can help conserve the usefulness of a scarce resource when it is beneficial to farmers.

Introduction

What is Integrated Pest Management or as it is popularly known "IPM"? This concept was initially developed as an integration of chemical and non-chemical control (Stern *et al*., 1959). The underlying basis of this concept is that pest management, to be successful, has to be strongly anchored in an ecological understanding of the agro-ecosystem (Smith and Reynolds, 1966). While it was initially thought to be an exercise by entomologists and agricultural scientists, the concept grew into a farmer education process and evolved into a participatory method of teaching farmers the skills to understand the agro-ecosystem (Dilts and Pontius, 2000). In the process, farmers better appreciate the factors that affect pest and natural enemy populations. A farmer-first IPM was very suitable for ecologically depressed agriculture in Asia, particularly in smallholder crops that relied heavily on insecticide use, such as rice production in the 1970s and cotton in the 1990s. The IPM program promoted by the Food and Agriculture Organisation (FAO) of the United Nations, focused on farmer education that helped farmers in shifting from dependence on chemical insecticides to a higher appreciation of existing natural biological control. By 1990, the FAO initiated a program that brought farmers to IPM field schools (Pontius *et al.*, 2002). This paper described a paradigm shift from a linear transfer of technology process to an education process that encouraged researchers, extension specialists and farmers in Asia, Africa and Latin America to work together (Figure 1). It attempted to suggest an additional role for researchers and extension workers in educating resource-poor farmers.

IPM farmer field school

The IPM Farmers Field School (FFS) is the primary learning approach used within the context of farmer education (Dilts and Pontius, 2000). Irrespective of the crop, the IPM Field School is a season-long learning experience. The important aspect of FFS is that the resulting process is learner-centered, participatory and relies on an experiential learning approach (Pontius *et al*., 2002). Some basics of farmer education organized in FFS are provided in Table 1. Understanding these basics is essential to differentiate participatory FFS from activities that purport to be FFS but actually belong to the linear approach of a top down prescriptive formula. The FFS approach was developed due to the felt inadequacy of addressing farmer's needs in developing countries. While the Training and Visit approach may be more appropriate for more developed countries where farmers receive better training in skills and knowledge and where there are fewer farmers to educate, the situation is quite different for resource-poor farmers trying to make a living in small farms. Hence, in the USA, there are about 10 cotton farmers per 1000 ha, while there are as many as 2360 cotton farmers in a similar area in Bangladesh (Figure 2). Besides being less literate, usually these resource-poor farmers have little access to opportunities to acquire skills much less do they have the ability to make informed decisions. A Farmer Field School addresses the issue of acquiring skills to seek more knowledge about the cotton agro-ecosystem leading to more informed decision-making. Indeed, skill development is critical to comprehending the complexity associated with

making informed decision (Schmidt *et al*., 1997). This development evolved into participatory IPM that "puts emphasis on the process of enabling farmers to attain agro-ecological knowledge as a basis for sustaining production" (Ter Weel and Van der Wulp, 1999).

To facilitate farmer education in FFS, there is a need to invest in training of IPM Facilitators. This is achieved in Training of Facilitators (ToF) programs initiated in each participating country. A ToF, like FFS, is a season-long education experience where potential educators are trained in leadership, facilitation, and ecology.

The benefits of farmer education in FFS can be gauged by initial results from selected FFSs in six participating countries of the FAO-EU IPM Program for Cotton in Asia. Usually, fields with IPM practices that encompass an understanding of the cotton agro-ecosystem in making agronomic decisions have a higher net profit as compared with that of similar fields where farmers followed normal practices (Figure 3). This may be attributed to a better knowledge of beneficial insects that exist in the field as noted by Thai rice farmers (Praneetvatakul and Waibel, 2002). Often this is translated into reduced use of chemical insecticides and greater attention to agronomic practices that are directly related to plant growth and productivity. Similarly, farmers who participated in Farmer Field Schools for potato farmers in Peru had significantly more knowledge about IPM practices (Godtland, personal communication).

Results from Zanzibar (Table 2), for example, also revealed that farmers benefited economically from participation in FFS (Bruin and Meerman, 2001). Over the last ten years, evidence that resource poor farmers have greatly benefited from an education program that focused on skills development to generate knowledge that leads towards better decision-making, have confirmed the realities of an FFS approach in three continents where such farmers live and work.

Beyond farmer field schools

FFS provided an entry point for farmers to learn science and in the process to become more critical thinkers. Some of the lessons learned in implementing FFS in Asia include the following: 1) by providing farmers an opportunity to learn and achieve greater control over the conditions they face at field level, helped farmers to empower themselves, 2) farmers can educate other farmers, 3) farmers are effective organizers after they learn critical thinking skills in FFS, 4) Farmers can do science. Early in the development of the process of farmer education, farmers responded eagerly to opportunities to continue with learning. Many farmers come forward to become teachers to fellow farmers in learning IPM skills (Pontius *et al.*, 2002). Indeed, farmer facilitators became a reality in Indonesia, China and Vietnam. In the FAO-EU IPM program for Cotton in Asia, developing farmer-to-farmer field schools (F2FS) was an important activity in participating countries.

An important development is the continuation of farmer groups after farmer education in FFS. These farmers come together to continue to use the skills acquired in carrying out scientific studies. Follow up studies of the agro-ecosystem invariably lead to a better understanding of the farming environment. For example, the skills learned in FFS led a group of farmers in Indramayu, Indonesia to study how outbreaks of the white stemborers developed and to take measures to avoid such outbreaks (Warsiyah *et al*., 1999). Besides stemborers, using knowledge generated about the ecosystem, farmers were able to study other insect groups (Ooi, 1998 and 2000; Ooi *et al.*, 2001). Besides insect pests, farmer groups were able to study plant disease management (Gallagher *et al*., 2002; Nelson *et al.*, 2001).

That farmers can organize themselves is described by Pontius *et al.*, (2002). Indeed, this activity is very important in dissemination of information generated by farmers. The possibility of self-financing has been described by Gallagher (2002). Hence, besides being able to be teachers to fellow farmers, farmers may be able to source their own funds to support learning.

It is also demonstrated that an FFS approach will help farmers address new technology such as genetically modified crops and can help conserve the usefulness of a scarce resource when it is beneficial to farmers. This was demonstrated by two groups of farmers studying the impact of Bt Cotton in the provinces of Hubei and Shandong. Analysis of net returns showed that IPM education helped cotton farmers to maximize the value of Bt cotton (Ooi, 2002).

Conclusions

In conclusion, educating resource-poor farmers is imperative if we hope to achieve sustainable agricultural development in developing countries. Experiences in the Farmer Field School approach in Asia, Africa and Latin America have demonstrated that this process is sufficiently robust to be adapted to local conditions. The realities, though, suggest that there are many cross roads along the way due to existing perceptions about how extensions work. Nevertheless, innovative leadership and commitments of the public sector in many countries have resulted in enabling environments where farmers learn new skills to solve their production problems, alleviate poverty and protect the biodiversity of the agro-ecosystem. As noted by, Ganpat and Persad (2002), a participatory IPM approach can succeed if there is a change in institutional arrangements, new policy support measures and innovative collaborative forms of working arrangements for research, exten-

sion and farmers. The need for substantial commitments by the government is emphasized by Fleischer *et al.* (2002). Participatory IPM does not stop at FFS. Skills learned in FFS will support sustainable farmer groups that continue to carry out experiments, organize themselves to farm better and to be more responsive to new research innovations.

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Table 1. *Some farmer field school basics (adapted from Pontius* et al.*, 2002)*

1. The IPM school is field-based and lasts fro a full cropping season.
2. An FFS for annual crops meets once a week with a total number that range from at least 10 to 16.
3. The primary learning material at an FFS is a field with selected crop/s.
4. The field school meeting place is close to the farming plots, often in a farmer's home.
5. FFS educational methods are experiential, participatory and learner-centered.
6. Each FFS meeting includes at least three activities, the agro-ecosystem analysis, a special topic and a group dynamics activity.
7. In every FFS, participants conduct a study comparing IPM with non-IPM treated plots.
8. An FFS often includes several additional field studies depending on local field problems.
9. Between 25 and 30 farmers participate in an FFS. Participants learn together in small groups of five to maximize participation.
10. All FFSs include a field day in which farmers make presentations about IPM and the results of their studies.
11. A pre- and post-test are conducted as part of every field school for diagnostic purposes and for determining follow-up activities.
12. The facilitators of FFSs undergo intensive season-long residential training to prepare them for organizing and conducting field schools
13. Preparation meetings precede an FFS to determine needs, recruit participants and develop a
14. learning contract.
15. Final meetings of the FFS often include planning for follow-up activities.

Table 2. *Impact of IPM training on yield and farmer income in Zanzibar (after Bruin and Meerman, 2001).*

Crop	Yield before IPM (per 0.1 ha)	Yield after IPM (per 0.1 ha)
Tomato	100-150 kg	200-450 kg
Amaranth	150-200 bunches	400-500 bunches
Radish	300-360 bunches	800-1000 bunches
Cassava	Gondo 270 kg	780
	Makangale 640 kg	1760
	Kiuyu 470 kg	1070
Banana	Mtwike 12 kg/bunch	21 kg/bunch
	Koroboi 7 kg/bunch	25 kg/bunch
Irrigated rice	150-300 kg	300-400 kg
Rainfed rice	80-220 kg	100-400 kg

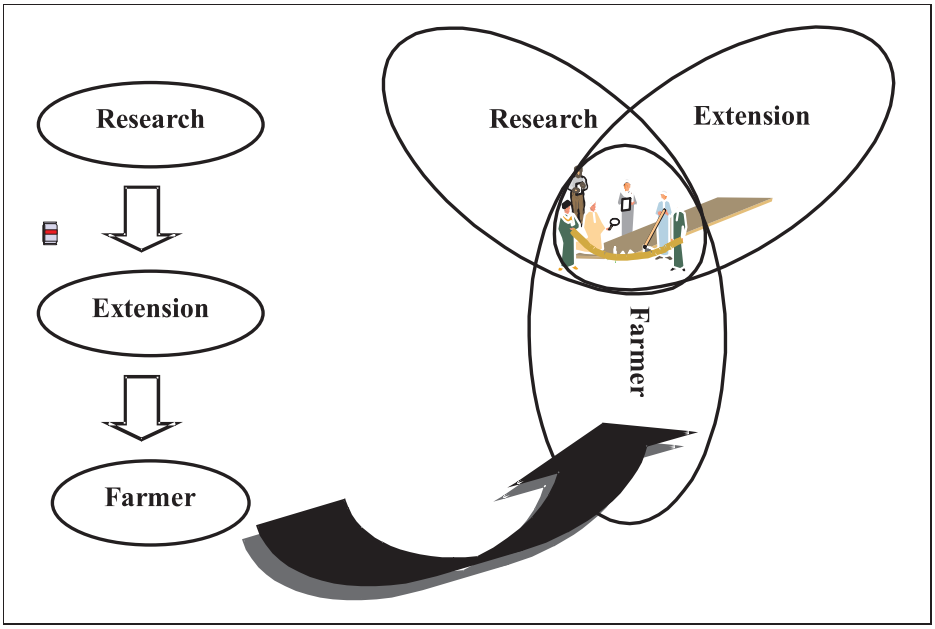

Figure 1. *Paradigm Shift – Research-Extension-Farmer Relationship (after Walter-Echols, personal communication, 2003).*

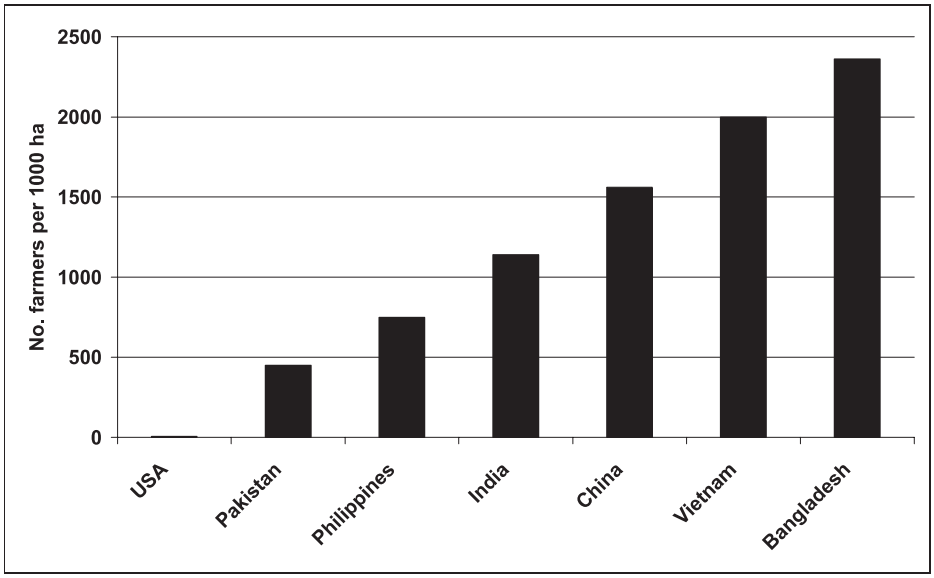

Figure 2. *Number of cotton farmers per 1000 ha. (Data compiled from various sources by Walter-Echols, personal communication, 2003).*

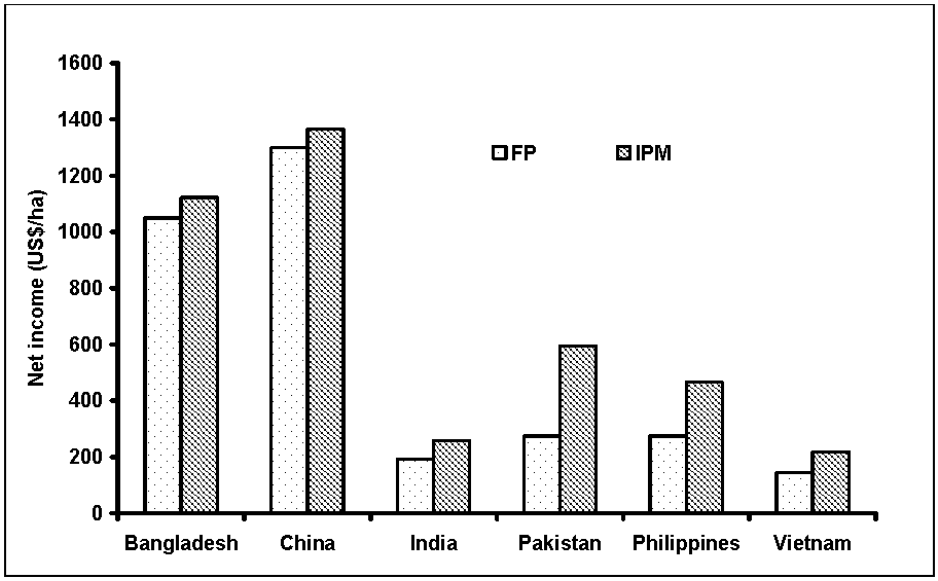

Figure 3. *Net income (US $/ha) obtained at selected Farmer Field Schools in six participating countries of the FAO-EU IPM Programe for Cotton in Asia.*