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# Appraisal of methods to evaluate farmer field schools

*Francesca Mancini and Janice Jiggins*

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*The need to increase agricultural sustainability has induced the government of India to promote the adoption of integrated pest management (IPM). An evaluation of cotton-based conventional and IPM farming systems was conducted in India (2002–2004). The farmers managing the IPM farms had participated in discovery-based ecological training, namely Farmer Field Schools (FFS). The evaluation included five impact areas: (1) the ecological footprint and (2) occupational hazard of cotton production; and the effects of IPM adoption on (3) labour allocation; (4) management practices; and (5) livelihoods. The analysis showed that a mix of approaches increased the depth and the relevance of the findings. Participatory and conventional methods were complementary. The study also revealed different impacts on the livelihoods of women and men, and wealthy and poor farmers, and demonstrated that the value of the experience can be captured also in terms of the farmers' own frames of reference. The evaluation process consumed considerable resources, indicating that proper budgetary allocations need to be made.*

KEY WORDS: Labour and Livelihoods; Methods; South Asia

## Introduction

The use of participatory methods to enhance the effectiveness of research and technology development in agriculture has found increasing support from institutions and donors since the 1980s. Declining productivity and increasing production costs are affecting the economic sustainability of small-scale farming in many developing countries, thereby compromising an important source of income for millions of people. This critical situation is particularly evident in the Indian cotton-farming sector, largely because of the massive and ineffective use of pesticides (Shetty 2003). In order to reverse these negative trends, the Indian government has been supporting innovative extension systems, which conceptualise the diffusion of technology as a social process based on adaptation and innovation by the users.

A notable example of participatory research and extension that engages researchers, extensionists, and farmers in on-site experimentation is the Farmer Field School (FFS). FFSs were conceptualised in the 1970s and 1980s and first implemented in Indonesia in 1989 to deal with a widespread outbreak of a rice pest that threatened Indonesia's food security (Pontius

*et al.* 2002). A few pioneering entomologists demonstrated that it was the enormous use of pesticides, which had been promoted by the government to control brown plant hoppers, that was the primary cause of the outbreak. Because agro-ecological relationships are inherently place-dependent and time-specific, it is ineffective to make decisions on the basis of the universal dissemination of standard technologies and simple messages in order to control crop pests. FFSs were therefore organised to teach rice farmers how to observe and measure, in their own fields, the ecological relationships underlying integrated pest management (IPM), and thereby help them to reduce their reliance on chemical pest controls (Kenmore 1996).

The focus of the FFS was, and still is, on learning through discovery, experimentation, informed decision making, and group or community leadership and action. FFSs thus have social goals beyond mere changes in pest-management techniques: goals that seek to position farmers as field experts, who collaborate with the extension staff to find solutions relevant to the local realities. FFS programmes emphasise farmers' ownership of development processes, partnership with other development agents, and group collaboration. Evaluations of the accomplishments of various FFS programmes agree in their main conclusion that attending an FFS strengthens farmers' ecological knowledge of pests and predators. In most reported cases, the understanding of the crop ecosystems has induced a reduction in pesticide use, as well as higher yields and profits – for instance, in sweet potato, potato, and cotton production systems. So far, the long-term sustainability of the changes in pesticide use has been questioned by only two studies, one on vegetables and one on rice, which have drawn opposite conclusions (Khalid 2002; Feder *et al.* 2004). Some authors argue that the economic feasibility of FFS programmes is in question, because it depends on the diffusion rate of the outcomes from the participants to neighbouring farmers. Studies conducted to investigate this diffusion have led to contradictory findings, perhaps because the diffusion of knowledge depends strictly on context and content (for example, Rola *et al.* 2002). FFS supporters shift the focus of the economic debate to the benefits of IPM-FFSs, contending that a reduction in pesticide use is likely to have beneficial effects on people's health, livestock production, water and air quality, biodiversity, and wildlife welfare at a regional level. They argue that returns on investments in IPM-FFS cannot be appraised until the pesticide-use externalities have been taken into account and properly quantified. (For a global review of the FFS experience, see Braun *et al.* 2006.)

In general, it is recognised that mono-disciplinary studies with pre-determined objectives are no longer considered sufficient to evaluate development interventions centred on people's empowerment. The multi-dimensionality of FFSs demands new methodological and conceptual efforts. First, it has been shown that contributions from several disciplines are needed to address the overall values of programmes that aim at people's empowerment. Second, both the function and agency of evaluation have been highlighted. While some authors argue that external evaluation contradicts the FFSs' core aim to transfer power to users (for example, Bartlett in this issue), others have been more concerned with the inability of conventional methods to capture unpredictable but relevant effects, thereby reducing the relevance of the findings for improving programmes (see, for example, Murray 2000). Participatory methods, however, are regarded positively as remarkably flexible: that is, able to be adapted during their application to the specific context and to increase accountability to users (Murray 2000). User participation in evaluation processes can have the functional role of increasing the efficiency of the programme being evaluated by providing useful feedback. In addition, their participation may be intended to empower users by prioritising the learning inherent in the evaluation process; this application has been defined as empowering participation (Fetterman *et al.* 1996).

However, there are also authors who question the methods and practices of participatory evaluation for their generalised lack of rigour and objectivity. They argue that the assumption that participation can lead to people's empowerment is naive. Cooke (2002) explains how the

acts and processes of participation can reinforce injustice and any imbalance in existing power relations, if the complex manifestation and dynamics of power are not understood. He claims that the currently available examples of applied participatory approaches can only reveal but never challenge power inequalities, and that therefore a 'misunderstanding of power underpins the participation discourse'.

The debate about how an evaluation should be assessed, what exactly should be assessed, and who should carry out the assessment is far from being solved, and probably there will always be divergent opinions; but it is clear that a broad array of evaluation approaches and methodological innovation are required to follow the evolving concept of evaluating development. In this article, we report on the case of an evaluation of the ecological, agronomic, social, and human outcomes associated with IPM-FFSs in India, using a range of methodologies from conventional to participatory. The aspects of sustainability addressed by the research were: (1) the occupational health of male and female farm workers engaged in the handling and application of pesticides; (2) the changes in farmers' agronomic practices, particularly in input use, determined by the adoption of IPM; (3) the reallocation of labour associated with the introduction of IPM tasks, and its gender implications; (4) the ecological impact of the emissions released into the environment by conventional, integrated, and organic cotton cultivation; and (5) the overall effects of the IPM-FFSs on livelihoods. Secondary aims of the research were to assess the role of participatory approaches to evaluation in enhancing the relevance of the evaluation, and to test innovative applications of the methods used.

The research framework, including methods for data collection and analysis, is briefly presented. The findings, published elsewhere, are summarised. We proceed to define the degree to which each method was participatory and at what stages farmers were involved. Finally, a critical review of the limitations and strengths of the methods used is reported.

## Study design

### *Research methods*

Data were collected between 2002 and 2004 from 20 villages in the cotton-growing states of Andhra Pradesh, Maharashtra, and Karnataka, to assess the short-term effects of IPM-FFSs up to two years after the intervention. The overall design followed the Double Difference (DD) model, identifying the FFSs as the treatment variable and studying the pre- and post-treatment situation for farmers who attended IPM-FFSs and farmers who did not (control). The control farmers were living either in the IPM-FFS villages (first control) or, in some cases, in villages from the same agro-ecological zone but where IPM-FFSs had never been conducted (second control). The matching criteria used to select control farmers were landholding and cropping patterns. The importance of using the DD model in assessing the impact of FFSs rests on the non-random (that is, purposive) selection of FFS participants. In many cases, FFS programmes used explicit criteria to select participant farmers, such as cropping pattern or high pesticide use. Involuntary bias related to villagers' different socio-economic status can lead, and in some reported cases has led, to a higher participation by the more progressive, educated, and wealthy farmers of a village. In the case treated here, it would be incorrect to attribute observed differences between FFS farmers and control farmers entirely to the FFS intervention, since they could be linked also to the characteristics of the selected groups. In this case, for instance, the involvement of women was actively promoted, with the result that, in 2004, in the villages where gender-sensitisation modules were implemented, the participation of women increased to 50 per cent, and across the project areas reached an average of 20 per cent. In order to generate gender-sensitive findings, the

**Table 1:** Analytical methods used in the evaluation

Method	Analytical approach
Health monitoring	Linear trend analysis (frequencies analysis and chi-square test)
	Multivariate analysis (multiple linear regression)
Farming System	Two-way ANOVA with time as repeated measure
Analysis and Labour	Canonical correspondence analysis
Allocation analysis	
Life Cycle Analysis	Canonical discriminant analysis
Sustainable	Consensus analysis
Livelihood Approach	Wilcoxon Matched-Pairs Signed-Ranks Test
	Step-wise and canonical discriminant analyses
Photo visioning	Text analysis

evaluation study was conducted in selected villages where women's and men's participation were nearly equivalent. In order to control for the bias introduced by this non-randomised sampling of the overall village population, differences between the treatment and the control group were analysed in terms of changes between two points in time and not in terms of absolute differences. Baseline data sets (pre-situation) were collected before the start of the FFSs, whenever needed and possible. The use of the DD model as the overall design also proved useful in revealing spill-over effects from participants to neighbouring farmers.

The research used the following range of methods.

1. A *health self-monitoring tool* within 24 hours of a spray event, based on a list of 18 signs and symptoms of acute pesticide poisoning and details of the field operations executed. The monitoring was repeated before and after the IPM-FFSs. The control case was initially included in the study; however, the response from the farmers not associated with IPM-FFSs was poor, and the data collection for the group was soon suspended (Mancini *et al.* 2005).
2. Questionnaire-based *Farming System Analysis*, including labour use. The labour questionnaire was developed using the FAO Socio Economic and Gender Analysis (SEAGA) tool (Mancini *et al.* in press).
3. *Life Cycle Analysis* (LCA) (Guinee 2002) was conducted in 15 conventional farms and ten IPM cotton-growing farms. An additional 12 certified organic farms were included in the study to inform upcoming policy on organic farming. Data on input use at household level were retrieved from farm records and in interviews with farmers. This component included only post-IPM-FFS information.
4. *Sustainable Livelihood Analysis* using the five capitals concept: financial, human, social, natural, and physical. This component included the FFS and control cases; pre information data were collected on a recall basis (Mancini *et al.* 2007).
5. Photo-based self-reporting of participants' perceptions (also known as *photo visioning*, see [www.photovoice.com](http://www.photovoice.com)) of outcomes and impact. The results of the photo visioning have not been published, but its methodological contribution is discussed.

### Data analysis

The five methodologies generated both quantitative and qualitative data, which were analysed using parametric and non-parametric statistical methods (Table 1).

## **Main findings**

The evaluation generated findings on the outcomes (change in practices, labour allocation, and yield) and impact (environmental pollution, human health, livelihoods) of cotton-system IPM-FFSs.

### *Health self-monitoring*

The health self-monitoring study documented that a strikingly large majority (84 per cent) of the monitored spray events led to mild to severe pesticide poisoning. The mainstream literature focuses on the people applying the pesticides; our findings show that the handling of pesticides in order to prepare chemical mixtures and refill tanks can also be extremely risky. In the studied communities, as in general in south Indian villages, these operations were mainly performed by women, who experienced a level of poisoning comparable to that of the men. Marginal farmers belonging to low-income classes suffered ten-fold more poisoning than larger land owners, perhaps because of their lower nutrition status and weakness induced by other diseases. Acute pesticide poisoning therefore affects a much larger population than the actual spray operators.

### *Farming System Analysis*

The analysis of the agronomic practices in conventional and IPM-converted cotton systems showed that the current use of pesticides in cotton is largely superfluous; training in alternative plant-protection measures (IPM-FFSs) resulted in a drastic reduction in pesticide use (78 per cent) without compromising crop yields. The adoption of IPM had no consequences for the overall labour requirement of cotton cultivation, nor the total time spent on plant protection, but the types of task performed to control pest damage changed. A time shift from pesticide application to IPM tasks was reported, resulting in a higher contribution of female work to plant protection. The availability of female family workers was shown to be a factor that might limit IPM adoption.

### *Life Cycle Analysis*

Conventional cotton cultivation pollutes the environment, causing loss of biodiversity, water contamination, increased carbon emissions, acidification, and eutrophication. The practices responsible for these adverse effects are the use of synthetic inputs and carbon-depleting operations such as the burning of organic matter in the field. Organic management was shown to reduce these negative effects to negligible levels, while IPM reduced the negative impacts associated with the use of pesticides, but not the global-warming potential. The close-to-zero environmental impact of organic farms in the case studied was achieved at the cost of substantially lower productivity than conventional cotton farms (20 per cent). IPM farms achieved yields higher than conventional farms (30 per cent).

### *Sustainable Livelihood Analysis*

The gains reported above – better health and environment, reduced cost of cultivation, escape from debts, and increased ecological knowledge – were also those perceived by farmers as enhancing their livelihood. However, farmers also expressed a clear appreciation of the increased social capital, in terms of stronger networks, norms, and social trust that facilitate co-operation and co-ordination for mutual benefit, which they associated with attending

IPM-FFSs, which was perceived as a resource to achieve better development and control over their own destinies. Specifically, the social benefits were described in terms of increased collaboration between villagers and stronger connections with agricultural officers and village authorities. Collective action in the Indian rural society studied takes place typically in informal networks, rather than in the official groups registered to receive the financial incentives given by the government. It has been shown elsewhere that communities with higher collective action are more inclined to act for mutual benefits (Krishna 2003). The evaluation study also revealed that the process of personal growth stimulated by participation in the IPM-FFSs was particularly relevant to women, and it confirms the importance of increasing women's access to educational programmes.

### *Photo visioning*

The pictures taken were grouped by the farmers in photo-visioning workshops, at which the photographs were analysed into clusters, connected by causal or explanatory linkages. This process generated new insights into the occurrence of and the relations between unpredicted impacts, such as improvements in animal health and production, as well as in non-target crop management.

## Methodological appraisal of the evaluation

Some study components aimed to provide in-depth information concerning a selected aspect of the evaluation and therefore used methods selected to *describe* the behaviour of a small group of farmers/farms – the health monitoring, and the photo visioning. Findings obtained through these descriptive methods can be *extrapolated* with caution to a larger population who might be considered similar (but for whom there is no direct evidence). The Farming System Analysis, the LCA, and the SLA on the other hand aimed to *explain* the behaviour of a representative group of the total population and to allow for *generalisation* of the findings. Given the different informational objectives of the methods of enquiry used, we now turn to assessing the degree of participation, data validity and accuracy, and other strengths and weaknesses of each method. The participatory methods are also evaluated in terms of their educational value, empowerment, and contribution to gender analysis.

### *Defining the degree of participation in the methods used*

The extent to which each method used in this evaluation was participatory is defined here according to the four criteria described by Lawrenz and Huffman (2003): (1) type of evaluation information collected, such as defining questions and instruments; (2) participation in the evaluation process; (3) decisions concerning the data to provide; and (4) use of evaluation information. 'Outsider' evaluators defined the study objectives and selected the research tools in each case. Farmers' involvement in the decision making pertaining to the four steps of the methodology is outlined in Table 2. The LCA and Farming System Analysis represent the non-participative end of the spectrum, being based on questionnaires developed from the reference literature and preliminary diagnostic studies in the field, and leading to findings that were difficult to share directly with the local communities. The health-monitoring study had a primary research focus; however, it also had the additional educational value of being built into the FFS curriculum and therefore was coupled with access to a viable alternative to the use of pesticides. In the SLA, farmers defined the meaning of the concepts that framed the enquiry, and decided on the type of information to be collected within the given framework. The closest to full participation, or

**Table 2:** Participation of farmers in decision making and programme evaluation

Method	Time of investigation in relation to FFS	Decision on information to be collected	Farmers' participation in evaluation implementation	Format of data collection	Users of evaluation information*
Health monitoring	During and Post (1 year)	Outsiders	Required	Pre-developed visual format	Programme staff and donors, researchers, national policy makers, farming communities
Farming System Analysis	Pre and Post (1 year)	Outsiders, farmers (partial involvement)	Required in the planning phase	Questionnaire Focus-group discussion	Researchers (programme staff and donors, national policy makers)
Life Cycle Analysis	2nd year after	Outsiders	Not required	Questionnaire	Researchers (policy makers)
Sustainable Livelihood Analysis	1st and 2nd year after	Outsiders, farmers	Required	Open-question interviews	Farming communities (programme staff and donors, researchers, national policy makers)
Photo visioning	1st year after	Farmers	Required	Photos	Farming communities (programme staff and donors)

\*In the column, the actual users of the findings are indicated, and in brackets potential users are given.

empowerment evaluation, was the photo-visioning study, which was entirely carried out by farmers. The information collected was processed during farmers' workshops and translated into a collective commitment to move towards more sustainable farm management.

### *Strengths and limitations of the conventional methods used (LCA and Farming System Analysis)*

The LCA generated comparable and repeatable results based on regional- and global-scale indicators. An objectivist approach was required in order to ensure an impartial evaluation and allow for generalisation. It generated insights relevant to policy advisers and cotton producers regarding strategic choices for minimising pollution at national level. It is possible to do scenario analyses of LCA applications in order to predict long-term trends, and very often environmental policies have been shaped by the findings of an LCA. However, modelling simplifies realities in theoretical systems that can be quite far from the empirical situation and do not take into consideration the effects of local circumstances. Also, data collection can be rather difficult and expensive if extended, for example, to water quality.

The questionnaire used for the Farming System Analysis was developed in consultation with the farmers and therefore sufficiently comprehensive and representative of the specific agronomic context. The limitations experienced during the survey were in relation to memory recall and the degree to which respondents were willing to give accurate information (bias introduced by the respondents). In conventional methods, respondents rarely have a direct stake in the results and, while this might ensure higher objectivity, it can also result in lower motivation to provide accurate and precise information. For instance, in the context of agrarian subsidies and official assistance programmes, farmers might have reasons to over- or under-report information on yields, income, input use, or production costs. The risk of biases introduced by the respondents is thus shared by all methodologies that place people as main informants, regardless of the degree of participation.

### *Strength and limitations of participatory methods used (health monitoring, SLA, and photo visioning)*

*Evaluation validity* Beneficiary Assessment (BA) – ‘an approach to information gathering which assesses the value of an activity as it is perceived by its principal users’ (Salmen 1995) – has become a widely recognised way to assess the validity of development interventions. The two examples of BA reported in this study – the SLA and the photo-visioning methods – showed that the livelihood concepts used were meaningful to the farmers, establishing the inner validity of the enquiry method, but it also showed that the overall evaluation framework, developed externally, had overlooked areas of impact relevant to farmers. (It might be important to note here that the researchers had an extended affiliation with FFS programmes and therefore were considered to be well informed about on-going debates on FFS impacts.)

Development practitioners agree on the importance of understanding the complexity of people's livelihoods and the inter-linkages that make impact in one area likely to be felt in others. SLA was instrumental in the analysis of these relational aspects and systemic interactions. For instance, its application in two cotton-growing regions revealed that the implications of the knowledge acquired in the FFSs were determined by the farming context. Specifically, during a season favourable to cropping, IPM-FFS farmers achieved better yields at lower cost of production, and in the circumstances of a drought were better able to minimise financial losses than the control farmers in the non-IPM-FFS villages. Given that drought in the

study area is fairly regular, the study outputs suggest that a stronger focus on livelihood vulnerability and resilience would increase IPM-FFS efficiency.

However, the validating function of participatory evaluation also meets firm opponents. Mosse (2001) asserts that in participatory approaches local knowledge is often manipulated and instrumentalised to legitimate project objectives and the decisions already made. He regards people's knowledge as a political artefact, reflecting the expression of existing power relations among the participants, as well as participants' strategic adjustment of their needs to match project deliverables. Even though this seems to indicate areas for essential improvements, rather than invalidating the theory of participation, the evaluation reported in this article noted that dealing with existing unequal power relations to facilitate social inclusiveness and gender equity in IPM-FFSs was a demanding task. In FFS weekly meetings, conflicts of interest among participants often surfaced and remained unaddressed. The participatory evaluation tools and processes used in this study were not able to investigate problems arising from the representativeness of participation in IPM-FFS implementation. The sampling procedure of the evaluation took care to ensure a fair representation of women and poor farmers; however, to what extent their will and opinions were evenly reflected in the findings is difficult to state for the more participatory methods such as the photo visioning.

*Evaluation accuracy* It has been observed that people who are motivated by feelings of ownership of the process provide more complete and accurate information. For instance, pesticide-poisoning studies based on questionnaires have shown much higher poisoning figures than hospitals registries, and directly observed poisoning rates have been recorded that are even higher than recalled information provided by farmers in questionnaires (Kishi 2002). This suggests that measured health data through participant observation or participant farmers' monitoring could increase data accuracy and contribute to a better understanding of the issue.

In this evaluation, the IPM-FFS farmers were predisposed to disclose reliable information, assured by the trustful relationship that linked them to the facilitators. However, extensive and sympathetic interaction between project participants and evaluators can be seen as a source of possible bias. In the health monitoring, for instance, it was considered that the respondents, extensively trained in poisoning diagnosis, were likely to be involuntarily biased towards reporting higher levels of poisoning. The researchers subsequently estimated the level of over-reporting to have been between 17 per cent and 38 per cent, based on three dummy symptoms introduced deliberately into the reporting format. In the SLA, a generally positive attitude concerning change over time was recorded for the male respondents who had been FFS participants; even though the variation among respondents was high (suggesting reliability), the risk of bias from FFS-affiliated respondents remains a danger.

The language used to conduct participatory methodology is unmistakably the one spoken by the local communities. However, if the stakeholders involved speak different languages and/or the scope of the evaluation goes beyond evaluation at community level, some of the depth of the findings can be lost in the analysis. The senior researchers relied on translated texts, as the investigation was carried out in the local languages, and this might have limited the accuracy of the transcribed information.

*Empowering evaluation?* The opportunities for empowerment provided by participatory evaluation are entailed in the process through which such evaluations proceed – an experiential learning cycle. Starting from a concrete experience, participants conceptualise and apply new

principles that can lead to a mental transformation (Percy 2005). This evaluation study showed that the deeper understanding of the occupational hazard of handling pesticides indeed induced a change in the FFS participants' attitudes towards pesticides.

There are other features of participatory evaluation that can be seen as a means to increase the representation of people's own meaning and purpose. Visual aids, for instance, assist the co-generation of knowledge through non-verbal representation and dialogue. The photo-visioning method in particular helped people less confident in verbal communication or drawing techniques to express themselves, and to convey deeply textured meaning through the stories told around the photos taken.

The health monitoring, however, provided an instance in which participatory principles were traded off against pragmatic aims. In the periodic meetings organised during the self-health assessment to review monitoring forms, various health issues were surfaced but not properly followed up because they went beyond the specific research outline. In a truly empowering participatory evaluation, local control and autonomy would have overridden the need to comply with a set of fixed objectives. Asking the people to participate in the project's agency limited the empowering scope of the process through which the method was applied.

Finally, participatory methodologies can be rather time-consuming (the health monitoring), adding an extra task to the already demanding daily schedule of farmers, particularly in the case of women farmers. Their application at regional level can be difficult. Participatory techniques are usually applied with a small number of people to ensure in-depth interactions, and to study specific local outcomes. However, a participatory study method applied with a research purpose can generate results through a rather standardised procedure and statistically comparative frame, as was the case with the SLA study.

### *Participation and gender*

Participatory techniques are not gender-sensitive *per se*, but they can be if accompanied by an approach sensitive to diversity of ethnicity, gender, age, class, religion, and culture. The FFS model, with its emphasis on peer review and informed decision making at individual, group, and community levels, might leave the priorities of weaker groups unexpressed or unaddressed (Guijt and Kaul Shah 1998). Prior to the evaluation, substantial time was dedicated to focus-group discussions and to the eliciting of labour calendars with women and with men, and to periods of participant observation. This work shaped the definition of data requirements and the data-collection procedures. Data disaggregated by gender and social class were collected for every evaluation domain, except the LCA. The following study dimensions would have been missed without the participation of women in the overall evaluation.

The list of operations surveyed by the labour-allocation analysis included a number of secondary operations performed by women that are frequently overlooked. Their inclusion allowed for a more accurate estimation of the labour requirement in cotton farming. In turn, the study showed that the availability of female labour is a factor influencing the rate of IPM adoption, invalidating the misconception that plant-protection measures are entirely a male domain. The gender-labour analysis, paired with participant observations, also laid the foundations for the health monitoring, by revealing the separation of roles in pesticide application. The SLA revealed that building human capital was particularly relevant for women, who developed, through the IPM-FFSs, the confidence to voice their needs and opinions. It is important to realise that the introduction of new technology or management has social and gender implications that need to be taken into account in evaluation studies.

The evaluation did not analyse the social class, religion, or any other cultural variables of the women attending IPM-FFSs in relation to the total village population, and it cannot therefore

offer conclusions on the issue of social inclusiveness in the IPM-FFSs. Capturing these aspects was beyond the initial scope of the evaluation and not within the reach of the methods used. However, the study has provided evidence that IPM-FFSs are relevant to women and poor farmers, and that targeting strategies, including facilitators' training in problem-solving skills and gender-sensitive approaches, are needed to overcome barriers to their participation.

## Conclusions

The evaluation study applied two methodological approaches – conventional and participatory – which made different, but equally rigorous, claims to knowledge. The former provided an objective measurement of selected environmental and social impacts generated by different cotton-production systems. The findings generated are particularly relevant to refine the technical content of the IPM-FFS curriculum, as well as national plant production and protection policies to minimise pollution and sustain farmers' returns. The study also revealed that the same intervention had different impacts on the livelihoods of women and men, and of wealthy and poor farmers, and that the value of the experience can also be captured in terms of the farmers' own frames of reference.

An effort has been made in this article to assess the impact of the methods, and to make a transparent and systematic interpretation of findings which have been validated with reference to both the experience of farmers and scientific peer review. However, we consider that when the object of study is the messy real world, no findings can be considered final or absolute.

## References

- Braun, A., J. Jiggins, N. Röling, H. van den Berg, and P. Snijders** (2006) 'A Global Survey and Review of Farmer Field School Experiences', Nairobi: International Livestock Research Institute, and Wageningen: Endelea.
- Cooke, B.** (2002) 'The case for participation as tyranny', in B. Cooke and U. Kothari (eds.) *Participation: The New Tyranny?* London: Zed Books.
- Feder, G., R. Murgai, and J.B. Quizon** (2004) 'Sending farmers back to school: the impact of farmer field schools in Indonesia', *Review of Agricultural Economics* 26 (1): 45–62.
- Fetterman, D. M., S. J. Kaftarian, and A. Wandersman** (1996) *Empowerment Evaluation: Knowledge and Tools for Self-assessment and Accountability*, Thousand Oaks, CA: Sage Publications.
- Guijt, I. and M. Kaul Shah** (1998) *The Myth of Community: Gender Issues in Participatory Development*, London: Intermediate Technology Publications.
- Guinee, J. B.** (2002) 'Life Cycle Assessment: An Operational Guide to the ISO Standards', The Netherlands: Ministry of Housing, Spatial Planning and Environment (VROM) and Centre of Environmental Science, Leiden University (CML).
- Kenmore, P.** (1996) 'Integrated pest management in rice', in G. Persley (ed.) *Biotechnology and Integrated Pest Management*, Wallingford: CAB International.
- Khalid, A.** (2002) 'Assessing the long-term impact of IPM Farmer Field Schools on farmers' knowledge, attitudes and practices. A case study from Gezira Scheme, Sudan', in *International Learning Workshop on Farmer Field Schools (FFS): Emerging Issues and Challenges*, Yogyakarta, Indonesia: CIP-UPWARD.
- Kishi, M.** (2002) 'Farmers' perceptions of pesticides, and resultant health problems from exposures', *International Journal of Occupational and Environmental Health* 8 (3): 175–81.
- Krishna, A.** (2003) 'Understanding, measuring and utilizing social capital. Clarifying concepts and presenting a field application from India', *CAPRI Working Paper* No. 28, Washington, DC: International Food Policy Research Institute.
- Lawrenz, F. and D. Huffman** (2003) 'How can multi-site evaluations be participatory?', *American Journal of Evaluation* 24 (4): 471–82.

- Mancini, F., A. van Bruggen, J. L. S. Jiggins, A. Ambatiputi, and H. Murphy** (2005) 'Incidence of acute pesticide poisoning among female and male cotton growers in India', *International Journal of Occupational and Environmental Health* 11 (3): 221–32.
- Mancini, F., A. H. C. van Bruggen, and J. L. S. Jiggins** (2007). 'Evaluating cotton integrated pest management (IPM) farmer field school outcomes using the sustainable livelihoods approach in India', *Experimental Agriculture* 43: 97–112.
- Mancini, F., A. J. Termorshuizen, J. L. S. Jiggins, and A.H.C. van Bruggen** (in press) 'Increasing the environmental and social sustainability of cotton farming through farmer education in Andhra Pradesh, India', *Agricultural Systems*, in press.
- Mosse, D.** (2001) "'People's knowledge", participation and patronage: operations and representations in rural development', in B. Cooke and U. Kothari (eds.) *Participation: the New Tyranny?* London: Zed Books.
- Murray, P.** (2000) 'Evaluating participatory extension programs: challenges and problems', *Australian Journal of Experimental Agriculture* (40): 519–26.
- Percy, R.** (2005) 'The contribution of transformative learning theory to the practice of participatory research and extension: theoretical reflections', *Agriculture and Human Values* 22: 127–36.
- Pontius, John, Russell Dilts, and Andrew Bartlett** (2002) *From Farm Field School to Community IPM. Ten Years of IPM Training in Asia*, Bangkok: FAO Regional Office for Asia and the Pacific.
- Rola, A., S. Jamias, and J. Quizon** (2002) 'Do farmer field school graduates retain and share what they learn? An investigation in Iloilo, Philippines', *Journal of International Agricultural and Extension Education* 9 (1): 65–76.
- Salmen, L. F.** (1995) 'Beneficiary assessment: an approach described', in *Social Assessment Series* No. 23, Washington, DC: World Bank Environmental Department.
- Shetty, P. K.** (2003) 'Ecological Implications of Pesticide Use in Agro-ecosystems in India', Bangalore: Environmental Studies Unit, National Institute of Advanced Studies, Indian Institute of Science Campus.

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