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**FAO/EU Integrated Pest Management Programme for  
Cotton in Asia  
(ALA/96/04) (GPC/RAS/164/EC)**

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**FINAL REVIEW REPORT**

**13 August- 3 September 2004**

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Country Reports:

Bangladesh;  
 China;  
 India;  
 Pakistan;  
 Philippines;  
 Vietnam

## Executive Summary

The FAO/EU Regional Programme for IPM in Cotton in Asia has had a significant impact in participating countries where cotton is an important crop (i.e. China, India, Pakistan), in terms of uptake of results by national governments. While the Programme carried out useful training activities in other countries and demonstrated the efficacy of Farmers' Field Schools as a method for interacting with farmers (i.e. Bangladesh, the Philippines, Vietnam), institutional factors and the minor significance of the cotton crop meant that the Programme had relatively less impact in those countries.

The achievement of the Programme is remarkable, given that it started late due to a long approval process, had to work with \$ 2 million less than had been indicated by the donor and was cut off after the first phase, while a longer involvement was foreseen. In fact, the investment flow during the first phase was directed at building training capacity that was to be used in later phases for farmer training. The donor initially had agreed with this strategy that was clearly spelled out in the Project Document.

The premature termination of the funding by the EU was brought about by a number of factors. The donor shifted priorities from agriculture to poverty alleviation, sector-wide approaches and biodiversity. The outdated Programme document did not contain appropriate references to the Programme's contribution in terms of poverty alleviation, farmer empowerment, women's emancipation, income improvement among small farmers, etc. However, the most important reason for the termination of the funding of the Programme seems to have been the decision by the donor to decentralise from Brussels to its development operations to the EU delegations in the different countries. Decision making about the Programme's future shifted to the delegations overnight, and the decision with respect to funding the second phase fell to officers who had no understanding of the Programme or prior experience with it.

The Review Team feels that the Programme was terminated on the basis of limited information, lack of understanding and donor-driven procedure, a decision that had little to do with the Programme's achievement or the opinion of the countries involved.

The Programme operated in six countries. In *Bangladesh*, the Programme fell under the auspices of the Cotton Development Board, an organisation focused on achieving production targets. *Hirsutum* ('American') cotton has only been introduced into the country in 1985, the crop does not fit into the farming system very well and the potential area for cotton production is relatively small. The activities of the Programme in Bangladesh have been effective in terms of training facilitators and farmers, even though the numerical targets were not reached because of the late start and early termination of the Programme. At the time of the external review, the Government was actively promoting the use of pesticides and sustaining the achievements of the Programme in Bangladesh is unlikely.

In *China*, the Programme has been successful by a number of criteria. In spite of the Government's strong push towards higher production, it is faced with a reduction of cotton production due to pesticide-induced pest problems in areas along the Yangtse and Yellow Rivers. As a result, the Government has embraced IPM in cotton and took over much of the funding of IPM Farmer Field Schools when the Programme's funding ran out. IPM in cotton fits into the National IPM Programme that has gained considerable experience also with IPM in rice and vegetables. In all, the Programme seems to have been relevant to the country's

perceived needs. Important is the fact that IPM Field Schools add significant value to the use of BT cotton, as was demonstrated by a study sponsored by the Programme in China.

*India* has no national IPM programme because agriculture is the responsibility of State Departments. The frequent 'pesticide suicides' caused by cotton crop failure among farmers who have gone deeply in debt to buy pesticides, are a cause of embarrassment for the Government of India authorities. The Programme has had a remarkable impact in the States of Karnataka and Maharashtra and to a lesser extent in Andhra Pradesh. In those states, the Farmer Field School has been accepted as the model for government-farmer interaction and state funds have been allocated for continuation and scaling up of Programme activities. Given this impressive acceptance of the Programme by these state governments, the discontinuation of funding of the Programme's regional activities such as technical assistance, exchange among national programmes, continued support of impact assessment and quality monitoring, and especially the flexibility and experimentation that FAO funds allowed, are deplored by the government officials involved. The Review Team feels that the achievement of the Programme in India is remarkable. At the same time, this very success gives cause for concern. The prospects for high fidelity massive scaling up of IPM Field Schools could have been much brighter with continued regional technical assistance and other support.

In *Pakistan* the Programme has perhaps had its greatest impact. Pakistan did not have previous experience with IPM Field Schools. Two huge provinces, Sindh and Punjab, where irrigated cotton is the major crop during the summer season, have embraced the IPM Farmer Field School as the dominant interface between government and farmers. As in India, the FFS fills a need that the regular extension approach apparently has not been able to satisfy. High officials in the Agricultural Research Council recognise the IPM Field School as the one approach that is able to enlist farmers in development programmes. Reduction of production costs through lower pesticide use is recognised as an important element in the competitive position of Pakistani cotton in the world market after the termination of the Multi-Fibre Agreement (and the preferential treatment of cotton from developing countries) next year. In Pakistan, the Programme inspired and was part of a National IPM Programme that has high Government support, and includes not only Farmer Field School activities, but pesticide policy development as well. Although the pesticide industry is deeply entrenched in Pakistan agriculture, the country has embarked upon a National IPM Project that will cover four Provinces and last five years. This Project will be entirely funded through national and provincial funds. The termination of the FAO regional technical assistance and the flexible funding of experiments and activities that do not fit government procedures was deplored in Pakistan as it was in India.

The Programme should perhaps not have been implemented in the *Philippines*, where in any case activities took place at a low rate compared to other countries. Very low profits received by Philippine farmers for their cotton have led to a sharp reduction in the area of cotton planted in the country. The existing strong national IPM Programme leaves no doubt that the climate for Farmer Field Schools is favourable, but cotton was not the crop to focus on.

In *Vietnam*, as in Bangladesh, the Programme fell under the auspices of the production-oriented National Cotton Company that in the end did not co-ordinate closely with the National IPM Programme. Training was well conducted, but IPM/FFS training activities by the Cotton Company will terminate with the end of the project funding. Cotton farmers in Vietnam still receive credit packages of which pesticides are an integral part. Farmers who decide not to use pesticides therefore seek to sell them to other farmers

In all, the Programme has been especially successful in China, India and Pakistan. This impact, in turn, has convinced the Review Team that, in the Farmer Field School, the FAO has an 'active development ingredient' that should receive high priority, also in terms of awareness raising. As it is, major donors such as the EU, and many staff within the FAO itself, are cognisant of IPM but not of the Farmer Field School that is the active ingredient in it.

The Programme has made a major contribution to the development of the IPM Farmer Field School approach. This is mainly due to the fact that the Programme has built in Impact Assessment and Quality Monitoring from the start. These activities have led to new and useful insights into the risks and vulnerabilities of the Field School approach that should be actively pursued to further develop the approach.

The experience of the Programme, both in terms of its success in convincing governments of major developing countries, and in terms of its failure to convince donors of its value, leads the Review Team to the conclusion that FAO should move away from its emphasis on crops, IPM, pesticides, etc., and move towards a new framing of the Farmer Field School within the international donor community. This reframing should emphasise biodiversity, poverty reduction, the education of rural people, water management and other Millennium Development Goals in which the Field School has a proven track record. Both the success and the failure of the Programme thus highlight the need for self-renewal within FAO.

## **Acknowledgements**

Since the Review Team split into two groups to visit the Programme countries, we have chosen to thank our hosts in each of the countries in the country reports that are appended to this main report. As one can learn from those reports, the staff teams of the Country Projects, often already as it were packing their bags in anticipation of the Programme's termination in October, have been exceptionally hospitable. They have spared no effort to give the Review Team excellent information and expose it to field results.

Here we would like to focus on the staff of the Regional Programme at FAO's Regional Office for Asia and the Pacific in Bangkok. Dr Peter Ooi, the Chief Technical Adviser of the IPM in Cotton Programme has facilitated the Review Team's visit in many ways, we are probably not even aware of all of them. What we have directly experienced is great hospitality and generosity, an excellent and very professional preparation of our visit, and characteristic refraining from any inclination to meddle in our work, showing either great faith in us, but more likely great maturity. Dr Gerd Walter Echolls, the Programme's Impact Assessment Specialist has made us very welcome and never tired of providing us with information and ideas. He also has carefully refrained from any attempt to influence the outcome of the Review. Mrs Chanphen Bhawangkananth, the secretary of the Regional Programme has been exceptionally efficient in supporting the work of the team. She knew what we would need long before we had discovered it ourselves. Also the other staff in the office, though perhaps less directly involved, has been kind and considerate, providing us with food and other needs at unexpected moments.

We are very grateful to Dr He Changchui, the ADG in Bangkok. Our exercise took place under his auspices. In addition, he has shown great interest in our progress and has organised a debriefing meeting where we presented our preliminary conclusions and recommendations that proved very useful in terms of the feedback provided by the FAO-RAP staff that came to the meeting and the encouragement provided. Unfortunately it was not possible to meet with EU representatives in Bangkok, given the limited timeslot available.

The teamleader's participation in the UN Roundtable on Development Communication in Rome immediately after the Review provided an opportunity to debrief with the FAO/GIF and other people concerned with the Programme, including Dr Peter Kenmore, Dr Andrew Macmillan, Dr Kevin Gallagher, Dr William Settle, Prof. Hermann Waibel (Hannover University), and others.

## 1. Introduction

The FAO-EU IPM Programme for cotton in Asia was approved, after a long gestation period, in March 1999. The Programme, covering Bangladesh, China, India, Pakistan, the Philippines and Vietnam, began operation in October 1999, when the Team Leader was appointed, based along with the rest of the Programme Management Unit (PGMU) at the FAO Regional Office for Asia and the Pacific, in Bangkok. Programme activities began in 2000 in China, India and Vietnam, and in the other three countries in 2001.

A mid-term evaluation of the Programme was carried out in October-November 2002. The evaluation concluded that the Programme was well on track to meeting its objectives. It endorsed the Programme's strategy of focusing initially on training of facilitators and farmers, through Farmers' Field Schools (FFS) and supported the new emphasis of the Programme on training of farmer facilitators. The evaluation urged that more attention should be paid in the remaining Programme period on building collaboration (with NGOs, researchers and the private sector) and supporting policy change, making use of the results of the impact studies conducted under the Programme.

The mid-term review focused on the issue of scaling up models for farmer training and concluded that the Programme had made good progress, but more time would be needed to evaluate their potential. Accordingly, it recommended that a formulation mission to identify opportunities to extend the Programme to more countries and farming systems where cotton and other crops were drivers of unsustainable and unhealthy pesticide dependency. It also recommended that the EU provide supplementary funding to cover the additional cost of activities agreed with it but not included in the original Programme budget that was formulated in the mid-1990s. Recommendations were also made for the Programme in each participating country.

While the recommendations relating to operation of the Programme were largely accepted and implemented, changes in EU policy and perceptions about the nature of the Programme led to a decision to terminate EU financing of the Programme at its originally scheduled termination date (October 2004) and also not to provide supplementary funding for additional, previously-agreed project components. This decision predictably had serious consequences on Programme operations, most particularly a drastic reduction in the planned level of farmer training in the last year of the Programme.

In accordance with the Programme document, a final evaluation was to be undertaken, to provide an independent assessment of the Programme's achievements and make recommendations for follow-up actions. Terms of reference were prepared and agreed in May 2004 and the mission took place from 15 August – 3 September 2004. Team members were:

Niels Röling – Team Leader  
Iftikhar Ahmad – Representative of the participating countries  
Sandhya Chatterji – Rural Development/Gender Specialist  
Alida Laurensen – Socio-Economic Impact Assessment Specialist  
Josef Margraf – Environment Specialist (EU representative)  
Robert Moore – Evaluation Specialist (FAO Evaluation Service)

The team had an initial briefing in Bangkok on August 16 and then split into two teams for the country visits, which took place from August 17-27. Team I, consisting of Mr Röling, Mr Margraf and Ms Laurence, visited Bangladesh, Pakistan and India. Team II, which included Mr Ahmad, Ms Chatterji and Mr Moore, went to China, the Philippines and Vietnam. Team members returned to Bangkok on August 27 to prepare the mission report. A final debriefing meeting was held at the Regional Office on September 2. The full mission itinerary is included as an annex.

## 2. Background

More than half of the world's cotton is produced by Asian cotton farmers, most of them small landholders. Within Asia, cotton production is diverse and this diversity is manifest among the countries participating in the Programme. At its initiation in 1999, world cotton production was 19 million tons of lint, produced on 34 million hectares. Three of the Programme countries were major contributors to the world total: China producing 3.8 million tons; India, 2.7 million tons; and Pakistan, 1.9 million tons. The other three member countries were very minor participants, each representing less than one-tenth of one percent of world production. Since initiation, there have been considerable fluctuations in world production, consumption and prices. Compared to 2002-2003, in 2003-2004, world production rose by 1.1 million tons (6%) to 20.4 million tons, while consumption was unchanged at a record of 21.1 million tons. With consumption outpacing production for the second consecutive season, world ending stocks shrunk to an estimated 8 million tons by July 31, 2004, down from 10.6 million tons in 2001-02 and the lowest since 1994-95. The Cotlook A Index, a measure of international cotton prices, averaged 69 cents per pound in 2003-04, 13 cents (24%) above the previous season and the highest in six seasons.

Higher prices are expected to boost world production to a record in 2004-05, exceeding consumption and leading to an increase in world ending stocks. World cotton production is forecast to rise by 2.2 million tons (11%) to 22.6 million tons in 2004-05, 1.1 million tons above the record set in 2001-02. World consumption is projected to reach a record of 21.5 million tons, up 350,000 tons from 2003-04.

In 2003-04 crop year China produced 5.2 million tons; India, 2.1 million tons; and Pakistan, 1.7 million tons; India and Pakistan producing less than projected. Cotton production in Bangladesh, Philippines and Vietnam remained stagnant and while expected to be higher in coming years, it would remain insignificant at one-tenth of one percent of world cotton production or less.

Cotton production in the six countries has been associated with significant use of chemicals to control pests. Insecticides currently represent 15-25% of seed cotton costs of production in China, India, Pakistan and Philippines, if labour costs are included. If one looks at small farmers' actual financial outlay, they represent a much higher percentage of total costs of production. Insecticide costs have represented an even larger proportion of costs in peak insect outbreaks in the early 1990s in China, Philippines and Vietnam.

High costs of insecticides have lowered the returns to growing cotton and resulted in declines in cotton area, especially in the Yangtse and Yellow River areas of China, in India and in the Philippines. High use of chemical insecticides has also been associated with build-up of pest resistance, decline in populations of natural enemies, degradation of the environment, and serious health problems among those spraying and picking cotton. Thus there is a strong argument for cotton IPM in all Programme countries.

The 'active ingredient' in the FAO/EU IPM in Cotton Programme in Asia is the Farmer Field School (FFS), the remarkable potential of which has already been demonstrated in rice, vegetables and other crop systems in Asia, although its impact is seriously contested, as we shall see later. IPM involves the use of a range of pest control methods that seek to maximise economic benefits to the farmer while protecting health and the environment. Principles of IPM are

- a) Grow a healthy crop;
- b) Base decisions on understanding field agro-ecosystem, including the role of natural enemies;
- c) Regular and careful observation of the field;
- d) Farmers are experts.

A FFS involves facilitated season-long experiential learning by farmers in village groups. Through the FFS, farmers become IPM experts and pest managers of their own crops. An FFS training programme starts off with Training of Facilitators (ToF), usually recruited from extension services, who every season train farmer groups. Continued training of new facilitators is expected to have a compounding effect over several years and to allow rapid expansion of the number and distribution of trained farmers to a level where IPM knowledge and practice becomes the norm in the farming community.

By educating farmers in IPM among others through experimentation with IPM methods, Farmer Field School Programmes seek to help farmers find solutions to their problems with chemical control of pests, so that returns to farmers can be increased, health risks can be reduced and production can be more sustainable. Often other impacts, e.g., in terms of empowerment, women's emancipation, and entrepreneurship are generated by FFS programmes. In order to be effective at the field level, FFS programmes need to promote co-operation among governments, research institutions, development agencies, extension services, and non-governmental organisations to improve training and support of farmer alumni groups after training. The development of national crop protection policies that provide a conducive context for IPM implementation at the field level often is an important framework condition.

### 3. Programme Objectives and Design

#### 3.1 Objectives

The Programme document was submitted to the EU in 1995 and the decision to fund the Programme was not taken until 1999. Its development objective and immediate objectives were not changed in the interim. The development objective in the Programme document focused only on cotton production, i.e. “sustainable, profitable and environmentally sound production of cotton in the participating countries, through the development and practice of IPM by farmers and extension staff”.

Given the heavy use of pesticides on cotton in Asia, which is costly and has profound impacts on the environment and human health, this was certainly a worthwhile objective. However, it was established several years earlier and by the time the Programme began operations, the Farmer Field School, the key ingredient of IPM, had become more visible as a powerful instrument of farmer capacitation. In fact, farmer empowerment and informed decision-making had become key programme objectives, yet this was not reflected in the stated development objective of the Programme. This was noted by the mid-term evaluation, which suggested that a more appropriate development objective was that “farmers in a cotton-based production system, through observation and experimentation, are empowered to solve pest and other production problems in their own fields”. This development objective would have shifted the emphasis from production to human resource development and more accurately reflected what the Programme was actually trying to achieve in the field. For donors with less detailed knowledge about the Programme, such an objective might have helped clarify what the Programme was about.

The “cotton production” objective influenced the choice of partners in Programme countries. Except for Pakistan, all countries had previous experience in IPM based on rice and/or vegetables, with already trained facilitators. However, in two countries (Bangladesh and Vietnam), the partner was the national cotton production company, for which farmer education was secondary objective to increased cotton production.

The Programme had three immediate objectives.

1. “To develop a cadre of IPM cotton trainers from existing extension or field plant protection staff to train farmers in Farmer Field Schools”. This was the initial focus of the Programme and received the greatest attention. If the Programme had given greater emphasis to farmer training, the investment during the first phase might have focussed less exclusively on Facilitator Training.
2. “To promote co-operation for cotton IPM among governments, research institutions, development agencies, extension services and farmers’ and other non-governmental organisations and to improve access for all interested parties from within and outside of the Programme area”. The Programme included activities to address this objective both within and among participating countries, through special studies, workshops and symposia. Of course, if the Programme’s development objective had been human resource development along with sustainable cotton production, the co-operation to be promoted would have been in the area of farmer education/FFS, rather than in cotton IPM.
3. “National policies on plant protection in cotton re-oriented to support IPM development in the six Programme countries”. This is an ambitious objective,

especially if one takes the *de facto* very short disbursement period of the Programme into consideration. However, creating a conducive policy context is an essential ingredient in any educational programme. Supportive regulatory measures provide the framework conditions for learning.

### 3.2 Design

The original Implementing Agreement between FAO and the EU (Agreement no. ASI/B7-3000/IB/96/150) was signed by the EU in February 1999 and by FAO in March 1999. The provisions of the document were flexible and this was beneficial, since a complex undertaking involving six different countries and institutional arrangements over five years would have been impossible to plan in great detail at the outset. In particular, the Implementation Agreement anticipated that an overall work plan and budget for the whole Programme would be prepared within six months of its commencement<sup>1</sup> and this would be updated annually for each country and for the Programme as a whole. The Inception Report of June 2000, prepared by the CTA at the time, served to set the output targets for the Programme as a whole. Annual work plans have been prepared since.

Thus, the original Programme design was found to be suitable. However, the initial budget was highly unrealistic, because it assumed almost full implementation already in the first year of implementation. Over-optimistic budgeting is common in programmes of this nature.

Annual work plans have been prepared in detail and are well monitored by the Programme.

The flexible programme design was adversely affected by a severe resource shortfall in the last year of the Programme, which is discussed in a later section of this report.

As was pointed out by the mid-term evaluation, the Implementation Agreement did not mention the intended beneficiaries of the Programme. In practice, the Programme has focused its attention on small-scale producers who grow cotton as part of their farming system. In this connection, the Programme has used data from the impact study to determine whether FFS attendees are relatively advantaged, compared to non-FFS farmers. Preliminary indications are that FFS farmers are somewhat better educated on the whole, but materially at about the same level as non-FFS farmers.

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<sup>1</sup> Commencement date was stated to be the arrival of the CTA.

## 4. Results in terms of Farmer and Facilitator Training

### 4.1 Facilitator training

IPM Training of Facilitators (ToF) is a field based season-long fully residential learning experience involving up to 30 future facilitators at a time. It has a strong emphasis on non-formal education and is normally conducted throughout a full crop-growing season. The participants, who will facilitate Farmer Field Schools after graduation, improve their technical expertise in IPM, develop participatory training skills, and enhance their management and experimental capabilities. The content of the ToF consists of ecosystem analysis, crop development and management, decision-making, participatory educational process, organisation and planning, gender sensitivity, special topics, group dynamics, etc. During the ToF courses, participants practise with FFS implementation by running a full season 'practice FFS'. When they have graduated they run FFS independently with some supervision from Expert Facilitators.

Objective 1 of the FAO-EU IPM Programme for Cotton in Asia was to develop a cadre of IPM facilitators. During the Programme, 64 season-long Training of Facilitators courses (ToF) were conducted; 27 financed through the project (against 21 planned) and 37 by the co-operating governments. A total of 1,642 participants graduated from the ToF, mostly government field and extension staff, but in some countries, also staff of co-operating NGOs completed a ToF (Table 1).

Table 1: ToF courses and graduates in the Programme Countries. 2000 – 2004

Country	Total		ToF			
	#	Pax	Programme		Government	
	#	Pax	#	Pax	#	Pax
<b>Bangladesh</b>	3	103	3	103	-	
<b>China</b>	8	225	8	225	-	
<b>India</b>	26	687	5	132	21	555
<b>Pakistan</b>	20	425	4	85	16	340
<b>Philippines</b>	3	80	3	80	-	
<b>Vietnam</b>	4	122	4	122	-	
<b>Total Programme</b>	<b>64</b>	<b>1,642</b>	<b>27</b>	<b>747</b>	<b>37</b>	<b>895</b>

The Programme was committed to continuing improvement of curriculum and facilitation in ToFs. Each partner country reviewed the ToF curriculum yearly through workshops, which preceded the next year's ToF.

The general impression is that facilitators who have been trained in the Programme's ToF are well equipped, they have learned a valuable alternative approach to extension and adult education, they have a better grasp of technical aspects of cotton production, and they have mastered the tools of Cotton Ecosystem Analysis (CESA). In most countries special attention was given to the development of participatory facilitation skills, since these are normally not addressed in the traditional agricultural extension approach and are extremely difficult to master. After the ToF, the facilitators appeared capable of generating experiential learning among farmers by using the skills they have acquired during their intensive ToF.

Apart from having learned new skills, the people trained in ToFs have given a new meaning to their role of extension workers, and gradually adapted it to encompass process facilitation in addition to technology transfer. However, it is uncertain how long such a change can persist given the generally authoritarian climate in most of the Programme countries.

Follow-up monitoring of facilitators' after their training is important to maintain the quality of their work and to help them adapt to their new roles. The Programme assigned this task to one or more National Expert Facilitators per country. In Pakistan and India, with their large numbers of ToF graduates, this monitoring was assigned to Expert Facilitators at the state or provincial level. The Pakistan PMU also developed a tool to assess the performance of facilitators that could be developed into a tool for self-monitoring and peer review between facilitators.

Some interesting and relevant follow-up initiatives have emerged: in Pakistan a number of associations of IPM Facilitators have been formed as a forum to share experience, sustain interest, keep up the spirit of innovation and implement FFS training for interested funding parties. The Pakistan National IPM Programme and some Provincial governments entered into a contract with five Associations for FFS/F2FS implementation in 2004. In India, free-lance IPM 'entrepreneurs' have been trained. These 'entrepreneurs' are individuals who intend to render advisory services for payment to FFS and Farmer Clubs. The State Government of Maharashtra financed the ToF training of those IPM entrepreneurs and contracted them for FFS implementation.

The Programme has made good use of its potential to add value to the quality of training in the respective countries. The Programme capitalised on existing training expertise in IPM /FFS in rice and vegetables, and thereby also provided continuity to national IPM programmes. Regional workshops provided an opportunity for exchange of training experience between countries. Countries have also been exchanging trainers and trainers have been used to start IPM-FFS activities in new counties: four IPM Facilitators of the Bangladesh project were engaged as Master Trainers in the first IPM Cotton ToF in Kyrgyzstan.

Programme trained facilitators are also highly recognised for their acquired skills and experience by other projects and NGOs. A number of them have found employment with NGOs (e.g., ETC in India for the development of organic cotton production) and in water- and watershed management projects funded by international donors (India).

#### **4.2 Refresher ToF (RToF)**

There is a need for continued support to ensure the quality of facilitators who can efficiently and effectively run Farmers Field School and support follow-up activities. In order to maintain this quality, the Programme introduced regular Refresher Training of Facilitators courses (RToF), which lasted two weeks, and aimed at enhancing the skills and refreshing the knowledge of the selected graduates of the ToF. An important complementary support mechanism was the follow-up visit by expert facilitators. This allowed for on-the-job performance assessment and immediate feedback.

All countries implemented these activities and RToF training. Unfortunately these courses were discontinued in 2004 due to the termination of Programme funding. The Programme did not last long enough to allow building funding of such activities into Government procedures.

### 4.3 Farmer ToF (FToF)

A Farmer Training of Facilitators (FToF) is an effort to train qualified farmer-facilitators to run farmer-to-farmer training, which could be lower in cost and hence an important element in scaling up and sustainability. FFS alumni with potential to become farmer-facilitators were selected to participate in these courses.

Table 2: FToF courses and graduates in the Programme Countries. 2000 – 2004

Country	Total		FtoF					
	#	Pax	Programme #	Programme Pax	Government #	Government Pax	Others #	Others Pax
<b>Bangladesh</b>	5	90	5	90	-	-	-	-
<b>China</b>	16	296	16	296	-	-	-	-
<b>India</b>	10	376	3	105	7	271	-	-
<b>Pakistan</b>	4	109	2	58	-	-	2	51
<b>Philippines</b>	-	-	-	-	-	-	-	-
<b>Vietnam</b>	6	63	6	63	-	-	-	-
<b>Total Programme</b>	<b>41</b>	<b>934</b>	<b>32</b>	<b>612</b>	<b>7</b>	<b>271</b>	<b>2</b>	<b>51</b>

The use and training of Farmer Facilitators was not envisaged in the Programme document. However, based on the developments and experiences of the FAO Regional Community IPM Programme for South and South-East Asia, training of farmer facilitators was widely adopted and started as early as 2000 in Vietnam. Over the next few years, all countries, except the Philippines, organised FToFs. By the end of 2004, 934 FFS alumni had been trained as Farmer Facilitator in 41 FToFs, of which 32 were Programme funded. (Details are given in Table 2).

Due to the late start of the Programme in Bangladesh and Pakistan and the premature termination of the field activities, only a limited number of FToFs were implemented in these countries. This has restricted the opportunities for expansion of the IPM-FFS approach through local human and financial resources.

In view of the importance given to scaling up of cotton IPM through farmer-to-farmer training, it is important to carefully monitor FToF and the effectiveness of farmer facilitators. In India the programme developed a model for quality assurance monitoring of FFS, F2FS and alumni groups. District officers (to monitor administrative aspects) and 3-4 ToF graduate facilitators in each state (for monitoring technical aspects) were given orientation training. Every crop season FFS monitors participated in refresher courses.

#### 4.4 Training of Farmers in Farmer Field Schools (FFS)

The Farmer Field School (FFS) is a primary learning approach used to educate farmers about IPM through a season-long learning experience. FFS are schools without walls, organised in the fields of participating farmers. About 25-30 participants meet for half a day each week for one entire season, from before planting until after harvest. At each FFS meeting, the members divide into small groups to make detailed observations of the crop and field conditions on two study plots: an IPM plot, and a Farmer Practice plot. These observations are recorded, discussed, and interpreted by the group, with assistance from the IPM facilitator. This analytical process, which is usually carried out on the basis of comparing drawings of what was observed, is called “cotton ecosystem analysis” (CESA). The balance among the elements of the agro-ecosystem is the basis for field management decisions made after discussion among all the FFS participants. The whole concept of FFS is to help farmers become better decision makers and the approach of farmer education encourages discovery learning.

FFS farmers carry out additional field experiments, such as defoliation studies to learn about plant physiological compensation after damage. They set up “insect zoos” to study predation and parasitism. Special topics are also studied in the FFS, including the effects of pesticides on natural enemies and on human health. Group dynamics activities build stronger farmer groups.

FFS curriculum development is undertaken as a joint effort of IPM farmers, IPM facilitators, and consultant researchers who collaborate on field experiments linked to pilot FFS. Usually at least two seasons’ work is required before the FFS curriculum is considered ready for wider implementation. In a number of countries, special topics related to pesticide hazards to human health and the environment were included, as were topics related to improvement and maintenance of soil fertility.

Table 3: FFS and graduates in the Programme Countries. 2000 – 2004

Country	Total		FFS Programme		Government	
	#	Pax	#	Pax	#	Pax
<b>Bangladesh</b>	115	2,875	115	2,875	-	-
<b>China</b>	929	26,776	559	16,112	370	10,664
<b>India</b>	1,248	30,682	325	7,990	923	22,692
<b>Pakistan</b>	426	10,939	208	5,341	218	5,598
<b>Philippines</b>	43	920	38	813	5	107
<b>Vietnam</b>	392	9,764	392	9,764	-	-
<b>Total Programme</b>	<b>3,153</b>	<b>81,956</b>	<b>1,637</b>	<b>42,895</b>	<b>1,516</b>	<b>39,061</b>

During the programme a total of 3,153 practice- and regular FFS have been organised, training nearly 82,000 farmers. About half of the FFS were financed through Programme funds, for the other half Government or funds from other donors were used (Table 3).

In view of the fact that women play substantial roles in cotton production in all Programme countries, it appears that women have been under-represented in FFS training (average female participation for the six participating countries is 20%). This discrepancy has been addressed by the Programme through insistence on including women in participant selection and by

organising FFS exclusively for women in countries where mixed participation is difficult or impossible (Pakistan, Bangladesh and India). In India female participation increased through the introduction of a pre-FFS session with a hands-on exercise on pesticide poisoning symptoms recognition.

At the community level several factors than culturally defined gender roles can hamper the introduction of IPM practices. Many small and marginal farmers in South Asia are financially dependent on moneylenders who often also are pesticides dealers. A change in production practices requires not only knowledge, but also a supporting environment in which these dependencies can be reduced. The Programme primarily addressed building farmers' knowledge, skills and self-confidence in reducing their dependence on pesticides. However, later the Programme paid special attention to building farmer organisations and to strengthening linkages with NGOs dealing with poor farmers and women as ways of enhancing the sustainability of IPM practices.

#### 4.5 F2FS

Farmer-to-farmer training (F2FS) involves skilled farmer-facilitators training other farmers in an FFS. F2FS allows enthusiastic FFS/FToF graduates to share their new knowledge with other farmers and is the major component of sustainable IPM practice.

Table 4: F2FS and graduates in the Programme Countries. 2000 – 2004

Country	F2FS							
	Total		Programme		Government		Others	
	#	Pax	#	Pax	#	Pax	#	Pax
<b>Bangladesh</b>	33	825	33	825				
<b>China</b>	132	2,878	102	2,224	30	654		
<b>India</b>	208	5,146	33	828	172	4,243	3	75
<b>Pakistan</b>	84	2,067	84	2,067				
<b>Philippines</b>	-	-	-	-	-	-		
<b>Vietnam</b>	36	851	36	851	-	-		
<b>Total Programme</b>	<b>493</b>	<b>11,767</b>	<b>288</b>	<b>6,795</b>	<b>202</b>	<b>4,897</b>	<b>3</b>	<b>75</b>

F2FS were first implemented in Vietnam (2000) and by the end of the Programme in all countries, except the Philippines. Farmers, who had graduated from an FFS and undergone FToF training, themselves trained nearly 12,000 fellow farmers during the life of the Programme.

Especially in India, China and Pakistan, the F2FS has become an important vehicle for IPM extension.

Taking the FFS and F2FS together, the total number of farmers trained during the Programme was nearly 94,000 in 3,646 FFS and F2FS (for details see Table 5). This is slightly below the target of 3,829, which is mainly due to the unrealistically high numbers of FFS set for the early project years. In all countries (except Vietnam), a cadre of skilled IPM Facilitators had to be trained before any FFS could be implemented. Since Programme-funded field activities

ended in 2004, the Bangladesh project could not implement the FFS and F2FS planned for 2004. In the Philippines, the number of farmers available for training was less than expected due to a sharp reduction in cotton growers in the Programme areas. Data for 2004 of Vietnam only include the (limited number of) 2003/04 dry-season FFSs but do not report on the wet season activities. At the other hand, India implemented twice as many FFS and F2FS in 2004 as scheduled and also Pakistan was well on track.

Table 5: FFS plus F2FS and their graduates in the Programme Countries. 2000 – 2004

Country	Total FFS & F2FS							
	Total		Programme		Government		Others	
	#	Pax	#	Pax	#	Pax	#	Pax
<b>Bangladesh</b>	148	3,700	148	3,700	-	-	-	-
<b>China</b>	1,061	29,654	661	18,336	400	11,318	-	-
<b>India</b>	1,456	35,828	358	8,818	1,095	26,935	3	75
<b>Pakistan</b>	510	13,006	292	7,408	218	5,598	-	-
<b>Philippines</b>	43	920	38	813	5	107	-	-
<b>Vietnam</b>	428	10,615	428	10,615	-	-	-	-
<b>Total Programme</b>	<b>3,646</b>	<b>93,723</b>	<b>1,925</b>	<b>49,690</b>	<b>1,718</b>	<b>43,958</b>	<b>3</b>	<b>75</b>

#### 4.6 Follow-up Activities of Farmers

Follow-up activities for FFS graduates span a broad range of training and research activities and forums. In Vietnam, most of them were developed and piloted in selected provinces with support from the FAO Community IPM Programme (Post-FFS activities for IPM farmer groups are often referred to as “Community IPM”). These activities are opportunities for further learning and for building local IPM programmes. Skills introduced in basic FFS are strengthened and expanded: planning, organisation, experimentation, observation, analysis, group discussion, decision-making, and participatory evaluation. IPM farmers can apply these skills, and the confidence gained in the course of IPM group activities, to many aspects of local policy making and development.

In many cases, follow-up activities have evolved into fully-fledged farmers’ organisations or associations involved in activities much wider than cotton IPM or agriculture. In countries with a strong history of welfare organisations and local NGOs, such as India and Pakistan, official, legally recognised registration is supported, giving the associations opportunities to open bank accounts, receive funds and act on behalf of the members. In Bangladesh the more enterprising Farmer clubs resorted to opening joint bank accounts in the name of club-committee members to be able to bank their capital.

Post-FFS activities can be divided into ‘farmer-to-farmer’ education, cotton production related field trial activities, other agricultural related IPM initiatives, income generating initiatives and social/community activities. Most farmer groups also included a saving or micro-credit component for members or needy villagers.

Most country programmes have actively supported farmer research activities, through Participatory Technology Development (PTD) or Participatory Action Research (PAR). Farmers decide on the issues to be studied, although these often stem from topics raised

during the FFS. Examples of such research are: conservation and improvement of soil fertility through the use of compost (India, Bangladesh), efficient use of fertilisers, testing cotton varieties, and experimentation with spacing and planting densities, pesticide application, and the use of 'organic' pesticides (Neem, NPV solutions, garlic and chilli mixtures, soap, etc.) Pakistan prepared farmers for a more scientific approach by offering them additional training in scientific experimentation. Topics studied and results obtained were often impressive, but generally they have been ignored by 'official' researchers. When researchers worked together with farmers it was more often to make use of them as implementers of the field trials designed by the researchers than to support farmer-initiated research. (For more details on the Bt Cotton research see below).

Many FFS alumni groups mention that they are applying the IPM principles now also to other crops. Even when participating in a Cotton IPM FFS was not that relevant for the farmer since they were not actively involved in cotton production, as was the case for female participants in Bangladesh, they considered their participation useful since they could apply the principles learned to other crops.

Most of the Farmer clubs had an income generating/saving/micro-credit element. Income would be generated through a membership fee, communal cotton production, production and sale of Neem-based pesticides, Trichogramma cards and vermi-compost or vermi-culture. In Bangladesh a group started a communal dairy farm. One of the clubs visited in Bangladesh gave credit to members to allow them to postpone their sale of cotton to a period with higher prices.

Some alumni clubs embarked on social-cultural activities for the benefit of the village: in India mass-marriages were arranged for poor villagers who could not afford the costs involved in a wedding; in Bangladesh literacy classes were organised. The importance of the farmer clubs as social organisations in their community is illustrated by the fact that many of the registered clubs in Pakistan and India were entered as 'welfare organisations'. In total 4,041 farmer clubs/organisations have been active during the Programme's duration, many were still active after the Programme had ended.

## 5. Implementation

### 5.1 Budget and Expenditure

The mid-term evaluation included a review of all expenditure up to the time of the evaluation (late 2002) and prospective expenditure through the end of the Programme in 2004. The report noted that the Programme got off to a slow start and that there was considerable under-spending in the first two years of operations (1999-2000) and some under-implementation in 2001. By 2002, however, the project was operating fully. The present report focuses on implementation since that date.

At the time of the mid-term evaluation, expenditures for 2002 were predicted to be \$3,053,663. Actual final expenditures for 2002 were \$3,245,761. For 2003, the prediction was \$3,682,682; actual expenditures were \$4,012,160. The increased expenditures were largely found under three headings: additional personnel, which were agreed to and added subsequent to the operative budget having been prepared; training (particularly for facilitator training) and travel, especially in connection with formulation of the Programme follow-up proposal. Due to the slow start of the Programme, even with the additional training activities, studies and posts, the Programme was under-spent at the end of 2003, although by only \$817,246, rather than \$1,338,822 predicted by the mid-term review<sup>2</sup>.

#### *Situation for 2004*

The Implementation Agreement and funding for the Programme were originally scheduled to end in 2003. At the time of the mid-term review, additional under-spending from 1999-2001 indicated that \$2.6 million would be available in 2004. The higher than foreseen expenditure in 2002-03 and decline in value of the dollar relative to the euro, reduced the amount available for 2004 to \$1.9 million, i.e. less than half the 2003 expenditures, just when the Programme had reached full implementation capacity and when the investment in trained facilitators was expected to be fully utilized for large-scale farmer training. At the time of the mid-term review, there was a continuing, long-time expectation that additional funds would be forthcoming, allowing this implementation capacity to be fully exploited. However, it did not happen.

One of the earliest activities of the Programme was a Cotton IPM Planning and Curriculum Workshop (Bangkok, February 28-March 2, 2000). Suggestions were made at that meeting for a number of additional activities not included in the original Implementation Agreement. The EU representative at the meeting announced agreement to the proposals and said that extra funding could be requested through a “rider” on the budget. The identified needs included: international training experts for project countries; additional field training for Pakistan; and a study on Bt cotton in China. The proposal, which was costed at an additional \$1,240,000 at the time, was officially submitted to the EU in June 2000.

With the EU’s assurance, confirmed in subsequent discussions, the Programme recruited the staff and contracted for the study. However, the request did not elicit any written response from the EU. This was not unusual because other correspondence, such as budget revision proposals, also received no acknowledgement from the EU. At the time of the mid-term

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<sup>2</sup> For the sake of comparison, Budget Revision B of April 2000 is used here. Subsequent revisions have reflected actual expenditures.

evaluation, an analysis was made of funding requirements to complete the farmer training programme and to “ensure and orderly conclusion of the Programme and/or transition to a second phase”<sup>3</sup> The recommendation was for additional funding of \$2 million, which took account of the additional posts in the project<sup>4</sup>, additional training to be carried out and increased costs since the budget had been prepared.

Inexplicably, despite prodding and the recommendation of the joint mid-term review, still no formal reply was received. Programme management was reluctant to appeal to higher EU authority for an answer, given the assurances it had received. Around the same time, the EU, which had previously been closely involved with project decision-making, began to distance itself from its operations. In particular, the EU did not send a representative to the Project Steering Committee meetings in 2002 and 2003.

By October 2003, the situation had become critical. No funds had been received, nor had any official response to the budget increase request been received from the EU. The EU officer dealing with the Programme had been transferred. At the request of the Programme, consultations took place between the FAO Liaison Office with the EU in Brussels and higher-level authorities in the EU. On the positive side, the consultation resulted in the release of some of the original funds that had been withheld and in a proposal to shift some unused budget line items. However, at the same time it was learned that:

1. The request for the additional funds had never been entered into the EU administrative system (neither the original request in 2000 for \$1.2 million nor the revised request for \$2 million);
2. The requested additional funds would not be made available;
3. A Phase II for the Programme was unlikely to be approved.

This information, coming at a very late date, confounded Programme management and the participating countries in the project, since all of them had heard the EU’s oral commitments. The work plan for 2004 had been prepared on the assumption that the budget rider would, in the end, be approved. However, a contingency plan was also prepared, in case the rider would not be accepted. Essentially, the failure to make available the required funds resulted in the termination of all project-funded operational activities, including farmer and facilitator training, refresher courses, policy seminars, field studies, etc. The only field activities were those that could be entirely funded by Government resources. In India and Pakistan, this support was considerable and made use of most of the trained facilitators. In China, there was some support but much less than in India and Pakistan. In Bangladesh and Vietnam, no FFS were held in 2004, while in the Philippines, only the on-going FFS within ToF (started in 2003) were completed.

The decision to terminate the Programme without a planned transition period had a negative impact on the Programme’s cost-effectiveness, since virtually all the investment had been made in creating training capacity (which is comparatively expensive) while the number of farmers that could be trained through FFS (at low cost) was severely truncated. The fact that many trained facilitators will have had little or no chance to practice what they have learned and little opportunity for refresher training will likely mean a rapid loss of the skills acquired.

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<sup>3</sup> Midterm Evaluation Report, section 8.5, para. 1.

<sup>4</sup> Including a liaison officer primarily to deal with Letters of Agreement with China.

## 5.2 Impact Assessment Studies

Impact Assessment (IA) has been an important, innovative feature of the Programme. A Regional Officer posted in the Programme headquarters in Bangkok was assigned responsibility for it and he has endeavoured to install an IA component in each of the participating countries, to measure the economic, social and environmental effects of the Programme. IA was an integral part of programme design and it was used as instrument for planning and organisational development.

In preparation for the IA studies, project stakeholders in each country engaged in an intensive dialogue for defining impact targets and for formulating objectively verifiable indicators of successful implementation. Later on, this process was extended to FFS implementation by engaging farmers in monitoring and evaluation. Thus quality monitoring became part of IA.

One intention of the IA was to use the ‘hard’ objective evidence as a tool in policy discussions with ministerial decision makers. To this effect, the Programme organised in 2004 a Regional Policy Seminar on IPM/FFS Impact where the results of the impact studies were presented and discussed. This Seminar was well received, but the final IA results were not available until after the termination of the Programme. Systematic use of the data with policy makers will not be possible.

The Programme commissioned a total of seven IA studies in the five countries (with three studies in China). The studies were conducted by independent local investigators from Universities (Bangladesh, Vietnam), an NGO (India), or the Social Sciences Department of the Agricultural Research Centre (Pakistan). In China, the implementing agency conducted the studies itself.

The design was as follows:

- *Baseline.* Members of FFS conducted during the first year were asked to recall their practices during the last season. Carefully selected fellow villagers and control groups were asked to do the same thing.
- *First Measure* A year after the FFS members completed their first assessment measure, answering questions about pesticide use, knowledge, etc., as they had for the baseline. ‘Neighbours’ and controls did the same. The data collection was conducted at monthly intervals during the growing season so as to minimise errors from recall information.
- *Second Measure* Some years into the Programme, a second measure is envisaged. It is hoped that this opportunity for providing evidence from a diachronic study has not been lost as a result of the premature termination of the Programme.

The sample of FFS farmers in each country comprised 60 – 120 farmers from three to four randomly selected FFS out of a total of 27-85 that were conducted during the first year in the respective countries. The ‘neighbours’ (60) were selected from the same communities as the FFS farmers. The control group, also 60 in number, were selected from three to four communities in another cotton growing area where no FFS was held or were scheduled for the coming years. Care was taken that these control communities did not share a market with the FFS communities. The total initial sample was 1,511 but because not all farmers interviewed during the baseline survey grew cotton in the year after the FFS, the number shrank to 1,182.

As usual in field experiments, it was a quasi-experiment. The experimental subjects were not randomly assigned to the different treatments, i.e. IPM FFS, Same Village or Control in Remote Village. Farmers selected for FFS had higher pesticide use before the Programme and differed in other respects, such as education and farm size, as well.

Together, the three measures over time would have allowed a diachronic study. As it was, by the end of the Programme on October 16<sup>th</sup> 2004, only the baseline and the first impact study would be available<sup>5</sup>. The results of these studies are, however, quite impressive and have been reported in the fourth and last newsletter of the Programme.

A follow-up study in a few years time would provide important additional evidence in the ongoing debate between those who claim that the FFS is an expensive and ineffective form of ‘extension’<sup>6</sup> and those who feel that the FFS is a form of Rural Education that provides essential qualification and capacity building to prepare farmers for the challenges ahead.

### 5.3 Special Studies

A number of studies were done as part of Farmer Field Schools in the participating countries. Some of these were of relevance for a particular ecology in a participating country; others were of significance to the overall concept of IPM, adoption of upstream technologies and across the region. Below is a list of these studies with a brief on the Bt cotton studies, because of their wider interest.

#### **Bangladesh**

- Biodiversity Study in Cotton
- Compost Production and Soil Health Improvement

#### **China**

- Bt cotton and IPM study
- Productivity Analysis of Bt Cotton – A case study from China

#### **India**

- Comparative analysis of the economics of Bt and non-Bt cotton production
- Studies on the effect of seed treatment and stem/foliar application with a systemic insecticide on the diversity and dynamics of the herbivores and entomophages in cotton ecosystem

#### **Pakistan**

- Quality Assurance Systems for Farmer Field Schools
- Effect of pesticides on soil biomass
- Effect of pesticides on the female reproductive hormones

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<sup>5</sup> In the Philippines, only the baseline study was conducted because of the very few cotton farmers in that country

<sup>6</sup> G. Feder, R. Murgai, and J. Quizon (2003). Sending Farmers Back to School: The Impact of Farmer Field Schools in Indonesia. Washington: World Bank, Policy Research Working Paper 3022, April 2003.

### **Philippines**

- Determination of the critical period of cotton-weed competition

### **Vietnam**

- Role of Women in cotton growing and participation in IPM Training

### ***Bt Cotton***

High expectations generated by international scientific and development community regarding the use of biotechnology as an engine for development has created an impression in some quarters that GMOs will solve pesticide problems on crops, obviating a need for IPM and farmer training. There have been efforts to adopt such crops, for example Bt cotton, in participating countries. An understanding of the impact of this technology has been considered important.

The project supported three studies on cotton in China and India:

1. Studies organised by the project and undertaken by farmers with the support of IPM Facilitators and national and provincial researchers in Xian Tao City (Hubei Province) and Weifang (Shandong Province) in 2001 and 2002
2. Studies on farmer use of Bt cotton in Shandong Province, China, undertaken by a PhD student, Diemuth Pems, from Hannover University.
3. Comparative analysis of the economics of Bt and non-Bt cotton production in India undertaken by Ms. Jana Orphal from Hannover Pesticide Policy Group in Germany.

Farmer research has compared pest levels, natural enemy activity, yield, gross margins (income less input costs excluding labour) and labour input profitability of Bt and conventional (non-Bt) cotton grown under IPM and non-IPM systems, and compared these to a no-spray baseline. The study suggested that:

1. Average pesticide use by non-IPM farmers does decline with Bt cotton but is by no means eliminated – surveys in Study 2 suggested an average of 11 sprays with a range of 5-22. Pesticide applications are even further reduced in Bt cotton grown by IPM farmers.
2. Average gross marginal income of non-IPM farmers may be similar or slightly better for Bt cotton, due to a decreased pesticide use that is partly offset by higher seed prices. But income advantages of Bt cotton may increase further when IPM farmers use Bt cotton.

It is also clear from the results of these studies that it might not be appropriate to think of Bt and IPM as alternatives. Including Bt cotton as an element of IPM systems can further reduce pesticide use and increase effectiveness and profitability of IPM. The benefit of Bt cotton to farmer livelihoods and income will depend on the availability and pricing of good seed. It is also clear that IPM training, by increasing farmers' capacity to critically evaluate inputs and their effects, and by reducing non-bollworm pesticide use, has the potential to help farmers maximise the value of Bt cotton. It may also have the potential to reduce the rate of resistance development to Bt cotton by lowering pest pressure and helping farmers to select high quality (= high toxin level) seeds. Of course, these remarks assume that a country has decided to introduce Bt Cotton and that this technology represents a 'treadmill' farmers cannot escape.

The study in Shandong, China showed that despite the exclusive use of Bt cotton varieties, pesticide use was still very high and even increasing. In 2002, cotton farmers applied pesticides an average of 11 times during the season and 70% of the applications were mixtures of two or more products, of which 35% were classified as highly toxic. Out of 150 farmers interviewed, 26.4% stated that they sprayed more often than in the first year after the introduction of Bt cotton. Only 6.3% reported fewer sprays while the majority (67%) detected no difference. The overwhelming majority (99.3%) of farmers perceived a decrease in cotton bollworm populations after Bt introduction, but at the same time they observed an increase in whitefly (98.5%), white butterfly *Pieris spp.* (71.7%), spider mites (59.7%) and boll weevil (52.6%). This increase in new pests probably accounted for the increasing use of pesticides on Bt cotton in Shandong.

On the other hand, pesticide consumption on Bt cotton was effectively reduced through Farmer Field School education. Using panel data collected before and after training, the results indicated that FFS had a significant effect on performance, i.e. graduates showed higher growth rates of their gross margin and yields as compared to the control farmers. Also the costs of pesticide use of graduates were significantly lower. For the third group of farmers, i.e. those that did not attend the training but lived in the same village, no significant difference was found with respect to the growth rate of gross margin and yield, but they also showed significantly lower pesticide costs. Hence, these results provided some evidence that the FFS training in cotton in China has been effective.

In India, the study showed that Bt cotton farmers in rain fed areas had lower returns than conventional farmers; under irrigated conditions, despite higher yields for Bt cotton, the differences in gross margins were non-significant. The yield advantage of Bt cotton under irrigation was offset by higher production costs and especially by lower product prices. The study concluded that one must be extremely careful with conclusions such as "*The Bt cotton crop has shown the bright side of a widespread genetically engineered crop*". This study, which uses farm-level data from the first year of commercial Bt cotton use, cannot confirm such optimism. Yield differences do not necessarily translate into differences of profit. A major yield factor is irrigation; therefore the potential advantage of Bt cotton can only be realized if access to water is assured. Such favourable conditions apply to only one fourth of India's cotton area. Based on the results of this study, the productivity of Bt cotton under rain fed conditions in Karnataka was no better or even below that of local varieties. This shows that the economic performance of a cotton crop is not only determined by its genetic make-up but also by the agro-ecological conditions under which it is grown.

An important factor that needs to be taken into account when assessing Bt technology is pest pressure. Productivity, pesticide use and economics of cotton production may be significantly different depending on the pest populations. If populations are low, then there is no need for pest control measures, including Bt. While IPM aims to gauge pest control measures on the actual pest risk situation in the field, the Bt technology applies its properties as a prophylactic measure. Thus, in terms of pest control strategies, Bt crops are a step backward to the era of calendar spraying and prophylactic treatments.

In India, there existed a large degree of misinformation among farmers with regards to the true biological traits of Bt cotton. This can quickly lead to a negative image of this new technology. Hence, there is a need for more farmer education. Here, the Farmer Field Schools could play an important role by generating a better understanding of the true properties and risks of transgenic cotton varieties.

Overall, the Indian study also underlines that one must be careful not to draw far-reaching conclusions about the prospects of Bt cotton in India too quickly because 2002 was the first season of commercial use. Nevertheless, the results presented in this study can serve as a starting point for further evaluation. Due to the high diversity of cotton growing in India more location-specific information is required. Thus, the benefits of conducting more economic studies in other areas would be significant.

In these studies the conclusions on benefits were derived from a comparison between Bt and non-Bt varieties instead of a direct measurement of the pest control effects of the Bt-toxin. Furthermore, costs of possible long-term ecological effects of Bt crops were not included and, most importantly, none of the studies have taken into account the uncertainty that underlies the parameters that determine the productivity impact.

#### **5.4 Information Sharing**

One of the most appreciated aspects of the Regional component of the Programme has been the dedicated effort to facilitate exchange of information among the members of the Programme. The Programme has published four issues of a Newsletter, the last of which presents the preliminary findings from the Impact Assessment exercise. It has organised several Programme-wide workshops, and staff from the country programmes have been able to visit each other's activities. Project expertise has been exchanged between countries: an example was the advisory mission to Pakistan by the APO working on women's health education in India.

The Regional component of the Programme has been effective in providing technical assistance. The country project staff visited by the Review Team mentioned the link to the international body of expertise as an ingredient in the success of the Programme and one reason why the termination of funding was regretted.

The Programme has actively promoted support of impact assessment and quality monitoring, through a Programme-wide workshop and efforts to implement Programme-wide criteria and procedures, while actively encouraging each country to identify its own key variables and criteria. This has been a positive achievement. On the one hand, the Review Team feels that comparability among countries has been safeguarded while on the other hand countries were free to gather information in areas most relevant to them.

This approach has not been limited to impact assessment. A key element of success was the style of programme management. There has been very limited imposition of central procedures, ideas and regulations. This non-directive style of management has been quoted several times to the Review Team as an important element in the goodwill that the Regional Component has generated.

Finally, the Programme has actively stimulated the production of video films and other materials to provide information and raise awareness of the issues addressed by the Programme. In Pakistan, a film called 'Hands Picking Poison' was effective in raising awareness of the health hazards and loss of working days as a result of pesticide poisoning of poor women and children employed as cotton pickers. In India, three agricultural officers took it upon themselves with the assistance of the Programme, to produce an illustrated field

manual for the recognition of natural enemies of cotton pests called 'Friends of Cotton Farmers'.

### **5.5 Implementation of Mid-Term Review Recommendations**

The mid-term review team (October-November 2002) made recommendations covering the remaining project period, for the post-project period and to individual participating countries.

The team recommended a more specific focus on target beneficiaries for the programme, i.e. training activities on other crops grown by cotton farmers, direction of activities to cotton-growing areas with greatest need and opportunity for poverty reduction, focus on existing cotton-growing areas, building up a critical mass of trainers to allow autonomous spread of cotton IPM technologies and approaches. The project responded to this, particularly in Pakistan, where operations were carried out among small-scale farmers in the Punjab and in the Philippines, where the focus shifted to the south (Negros Oriental and Mindanao). The Programme routinely included consideration of total farming systems that involved cotton.

The evaluation recommended that particular attention should be paid to demonstrating the positive impacts of the Programme on improved income, poverty reduction, health, women's capacities and in supporting follow-up activities after FFS. Unfortunately, the inability to complete and analyse all the impact studies due to unexpected termination of the Programme meant that definitive conclusions could not be drawn, but serious efforts were made in this direction. Results from India, where the studies were completed, were very positive and had a considerable impact on policy-makers. Other work related to documenting the positive benefits of the project was also recommended: on measuring the degree of social cohesion agreed and comparison of the quality of farmer facilitators with Government facilitators could not be done because the required funds for these studies were not forthcoming. Quality of training was a primary consideration for the Programme.

The team recommended an increased emphasis in the remaining project period on programme objectives related to research linkages and policy change and suggested the preparation of an overall strategy, which would be useful in preparation of a subsequent project phase. Since the project document with the EU could not be changed, efforts were directed instead at preparation of a new project, with a broader focus on farmer education (PIPMAP), which, however, was not accepted for funding by the EU.

The mid-term evaluation made a number of recommendations regarding incorporation of women into the Programme. The Programme improved accessibility for women farmers and made changes in the curriculum in some FFS where women were largely involved. While the Programme was pro-active in developing women facilitators, the number of women farmer-facilitators was rather limited.

Information dissemination was largely handled through the website and participation in international conferences. However, other types of information dissemination could not be pursued due to lack of funds.

The recommendations of the mid-term evaluation for future directions became moot when the EU decided not to fund a cotton IPM activity any further. All recommendations for countries were accepted and acted upon, with the exception of Bangladesh, where the Technical

Assistance Project Proposal was never signed, and DAE did not organize meetings of the various IPM programmes as suggested.

## 6. Effects and Impacts

### 6.1 Farmers

The impact analysis conducted by the Programme across five of the Programme countries<sup>7</sup> provides evidence that alumni of FFS implemented by the Programme, compared to (i) their pre-FFS scores and (ii) a sample of farmers in remoter control villages,

- Improved their incomes by 34% (with a substantial reduction in the number of participants who fell below the poverty line shown for Pakistan),
- Reduced pesticide use by 39%,
- Improved their ability to recognise natural enemies of pests, and
- Increased the extent to which they were consulted by other farmers.

A conservative estimate of the internal rate of return of the project by the Programme is 15%. An independent ADB consultant arrived at a figure of 25% for Pakistan. The Programme seems to have been a good investment for EU development funds.

FFS therefore seem to reduce the use of pesticides without adverse effects on yields and consequently to increase the economic return for the farmers. Farmers seem to gain confidence in their decision to reduce pesticide application after understanding the complexity of the agro-ecosystem, the appreciation of beneficial fauna and the adverse effect of pesticides on the ecological balance. In addition, farmers seem to have gained valuable experience with planning and farm management and are able to apply it to other crops. Reducing or even eliminating the use of pesticides has helped to restore the cotton ecosystem. Farmers noted "an outbreak of predators". They also seem more inclined towards eco-friendly alternatives to chemical pesticides such as Neem-based products, chilli-garlic sprays, etc. A number of FFS have been organised to experiment with organic cotton production. The FFS becomes a forum for farmer learning. At several places farmers clubs have been formed. Their impact seems to have been strong on both male and female trainees. Successful participants in an FFS seem able to critically evaluate the technologies and inputs offered to them by traders or 'advisors' and make well considered decisions. In all, the FFS seems a tool to qualify farmers to deal with the complexity and diversity, and to become more effective partners for extension services and development interventions.

Post-FFS Farmer clubs seem to energise FFS alumni and offer them opportunities for the development of entrepreneurial skills and initiatives. Initiatives such as communal cotton production, organic cotton production, dairy farming, bio-pesticide production (Neem, Trichogramma etc.) and vermi-culture are typical examples

Participation of farmers in a FFS seems able to improve their social and leadership skills. Through the weekly meetings involving group dynamic exercises, presentations, discussions and group organisation, farmers apparently gain confidence and can address meetings and officials without hesitation. This confidence is even more remarkable for the female participants, especially those from cultures where women are generally considered to be less knowledgeable than men and are not usually heard in public. The Review Team cannot but admit that it was impressed when poor Bangladeshi and Indian women claimed to have learned to address public meetings through the FFS

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<sup>7</sup> In the Philippines only the baseline was carried out due to the small size of cotton operations in that country.

This effect is not limited to review teams. Exposure of politicians or officials to a FFS in action or to an alumni group activity does not fail to capture their imagination, as has been demonstrated by the rapid uptake of the FFS as the preferred method of interaction between State and farmers in the Provinces of Sindh and Punjab in Pakistan, and in the states of Karnataka and Maharashtra in India. It should be noted that this effect is based on the perception of politicians and officials that the FFS seems an effective tool to push *their* agendas and enlist farmers in the realisation of *their* objectives. The Review Team did not have the impression that the effect of exposure is based on the realisation that the FFS allows new partnerships with rural people.

However positive the impact of the Programme seems, criticism of unsupported claims about FFS impact, and especially of unwarranted generalisations from small-scale pilots that have been carried out in conditions that cannot be replicated during scaling up needs to apply also here. As we shall see in the section on ‘Lessons Learned’ the impact analysis carried out by the Programme has demonstrated that the FFS has a number of vulnerabilities and risks, especially when scaled up, that require much more attention than they have received so far. The fact that the Programme has set up an impact assessment framework that allows for a diachronic study of impact over several years comparing alumni with neighbours and controls is an opportunity that needs to be taken up. We shall come to this point later.

## 6.2 Institutions and Policy

Impact of the Programme on institutions and policy has varied by country. In Bangladesh and Vietnam, the Programme was hosted by a dedicated Cotton Development Board or Company. The function of these organisations is especially to achieve production targets. In general, their activities are not very compatible with an educational effort, or with an IPM effort for that matter. The Programme was isolated from the National IPM Programmes in both countries. In Bangladesh, farmers only grow cotton on a relatively small proportion of the nation’s land, a proportion that is unlikely to increase. The National Pesticide Policy that exists on paper is not implemented due to insufficient capacity of the Government apparatus. In Vietnam, the original intention of involving the National IPM Programme in the implementation of the Programme, did not work out in practice. Impact was also not major in the Philippines, where there is a strong National IPM Programme of which this Programme was a part, because of the very small acreage in the country of cotton.

In China, cotton is an important crop and the Government is convinced of the need for IPM. A National IPM Committee, Provincial IPM Committees and County IPM Committees oversee the IPM activities. From a sustainability perspective, the Programme has been well embedded in the national institutional framework. FFS have been financed by the Chinese Government from the start of the Programme. Last year, all FFS were financed from public funds. Scaling up is envisaged through farmer-conducted FFS.

In India, where the project was implemented in three States, which not only contributed State funds from the start, but also adopted the FFS as the preferred interface between farmers and the public sector. In both states, this has led to the decision to rapidly scale up the use of the IPM FFS with the use of public funds.

In Pakistan the Programme has had the greatest impact on institutions and policy. A pesticide policy review and the simultaneous financing of a number of IPM-related projects led to the formation of a National IPM Programme (within the Institute of Plant and Environmental Protection which is in turn part of the National Agricultural Research Centre). The National IPM Programme is a well-conceived programme with a clear focus, objectives and goals. Its goal is a large scale and sustainable implementation of IPM in Pakistan, through rational pesticide use (i.e. reduction of pesticide use by 50%) while maintaining production levels and increasing farmers' profits.

A National IPM Project has been initiated for a period of five years that is to cover 4 provinces. It is guided by an Inter-Ministerial Advisory Committee and the National IPM Expert Committee. A National Coordinator IPM heads the activities. This National IPM Project is a continuation of the structure that was set up to implement the three technical assistance projects in IPM, including the FAO/EU Programme. In Pakistan the Programme thus has become institutionalised and rapid scaling up is foreseen.

In all, China, India and Pakistan have incorporated the main features introduced by the FAO/EU Programme in their national structures. Local funding is available for maintaining and scaling up the Facilitator and Farmer training. The Review Team considers this a major achievement for a Programme that in the end did not have much more than two years of effective disbursement.

This does not mean all is well. Throughout the region, the pressure of the pesticide industry is relentless. Cheap, i.e. broad-spectrum pesticides are produced in mass in China and are available throughout the Region. Advertisement for pesticides is ubiquitous in Pakistan, especially in Punjab where mono-cropped irrigated cotton dominates land use. In many of the Programme countries, the pesticide industry has a history of institutional entrenchment. The pressure from this industry is one of the risks associated with the rapid scaling up of IPM FFS especially in India and Pakistan. The Review Team is of the opinion that the competitive pressures which will emerge from when the Multi-Fibre Agreement comes to an end by next year will lead governments, keen on improving the competitive position of their national cotton industries, to adopt policies to reduce pesticide-related costs of production. Together with farmers striving to improve their incomes, this dynamic is likely to reduce the impact of the pesticide industry.

### **6.3 Gender**

In all the Programme countries, women are involved in almost all stages of cotton production, providing labour and acting as decision makers. Women assist in sowing, weeding, harvesting, and fertiliser application, in addition to carrying water required for pesticide spraying. Women are also actively involved in pest management operations such as handpicking of insects.

In spite of their role in cotton production, women have constituted on average only about 17% of facilitators and 20% of farmers trained. Women's relatively lower participation is mainly due to two reasons – firstly male domination within the extension system, which makes male extension workers address and select male farmers for training in FFS. Secondly, in countries such as India, Pakistan and Bangladesh, social and cultural taboos make it relatively difficult for women to participate equally in activities outside the home. To an extent, the timing of the FFS training (generally during the morning) and the need to attend season-long FFS training

also conflicts with other domestic responsibilities of women and limits their participation in the FFS.

Given the variations within countries and between different socio-economic categories within communities, the project has responded by designing special 'Women Open Schools' (WOS) in Pakistan and in a few cases conducting women-only training courses in India and Bangladesh. The WOS are highly appreciated in Pakistan and have led to many other initiatives for improving the condition of women. In India and Bangladesh however, the women seem to prefer mixed groups, since the women involved in the all-women FFS pointed out that it would be better to have a mixed FFS as both women and men are involved in cotton production and decision making. Also, the increased understanding and respect for each other were explicitly mentioned.

In all countries, once women joined the FFS they have been active and have demonstrated a tendency for a more intensive involvement than men (in terms of number of FFS sessions attended per season). During the Review Team's field trips, the women facilitators and farmers met were active participants in discussions and enthusiastic about the training they had received. They appreciated the knowledge gained during training and were ardent advocates for IPM and the FFS. They were articulate about the role of IPM in environmental protection, human health protection and the increase in farmers' knowledge. They were also aware of the economic benefits of reduced pesticide use and consequent increase in farmer's incomes.

Women have proved to be excellent observers with a fine eye for detail, which makes them active and articulate participants in FFS and IPM advocates at home and in their villages. Women facilitators also tend to do well; it can safely be assumed that in future they will be instrumental in involving more women farmers at the target group level. The experience from the project suggests that with FFS training, women gain confidence, and strengthen their status in society and their contribution to family decision-making.

## **6.4 Health**

One of the most important achievements of the Programme was awareness building about the effects of pesticide poisoning and its adverse effects on both human health and the environment, as a way to convince farmers to adopt IPM and reduce pesticide use. Modules on the topic are an integral part of the training. Through FFS, participants understand that there is no way to escape from pesticide contamination, even if farmers wear protective clothing. This is an entry activity for FFS to stimulate discussion with farmers on the health hazards of pesticides and the need for an alternative pest management system. The exercises on pesticide poisoning and the adverse effect of pesticides on the environment have helped to increase the enrolment of farmers, and especially women (India) in the FFS and F2FS.

Farmers use pesticides and insecticides in cotton cultivation much more than in other (food) crops, even if they are aware that pesticides are poisonous, since the perception is that cotton is not consumed and therefore they will not be affected and often economic considerations override health concerns. In India for example, over 60% of the total pesticides used in the country is for cotton cultivation. Typically farmers who have not been trained in IPM spray cotton fields between 6 to 15 times per season. Given the hot climate in most of the cotton cultivating countries and the poverty of farmers (and therefore inability to purchase protective measures for safe handling and spraying) farmers typically work barefoot, barehanded and

wear cotton clothes during spraying. During an average spraying session, farmers are directly exposed to pesticides for three to four hours per day through leaky spray operators, dripping plants and wind drift. Concentrated chemicals are mixed by hand and food is consumed between spraying sessions. Male farmers are exposed to pesticide poisoning during spraying and women (and sometimes children) are exposed to pesticides not only during mixing chemicals with water and refilling spraying tanks, but also during weeding and cotton picking when high residue levels are prevalent in fields. Agricultural workers and poor farmers are particularly vulnerable to poisoning given their existing high levels of malnutrition and incidence of infectious diseases.

Studies carried out by the Programme in India and Pakistan showed the effects of pesticide use on health. In India, reporting farmers (male and female) experienced symptoms and signs of mild pesticide poisoning in 20% of the cases, moderate in 56% and acute in 12%. The symptoms ranged from headaches, excessive sweating, burning eyes, nausea, vomiting, dizziness, blurred vision and in severe cases seizures. The illness always occurred after having sprayed or mixed pesticide solutions. Only 2% of the events were non symptomatic. The study also showed that farmers seek medical assistance or stopped working only in severe cases of poisoning. Nevertheless, both men and women reported considerable loss of work days during the season due to pesticide poisoning.

In Pakistan, a study on the effect of pesticide exposure on women's reproductive health especially reproductive hormones (LH, FSH, Progesterone and Estradiol) led to a pilot study with support from the AGFUND on "Pesticide Risk Reduction for Women in Pakistan" to develop training methodologies for rural women involved in cotton production, to enable them to take positive action to reduce the health risks associated with pesticides. Health self-monitoring became a major WOS activity during the pesticide spray seasons and participating women documented the signs and symptoms of acute pesticide poisoning incidences during one or two days after working in sprayed fields. Overall, the knowledge and attitude assessment revealed a significant change in rural women's perception of pesticides. After the training received in the FFS, women disseminated the information and knowledge gained to other family members, neighbours, relatives and fellow workers. An exploratory impact assessment revealed that 50% of WOS participants following precautionary pesticide risk reduction measures. In India, an FAO APO, Francesca Mancini from Italy, conducted an in-depth analysis of pesticide effects and the impact of FFS training. The results of this study will appear in a PhD dissertation and published articles.

## **6.5 Environment**

While not possible to quantify, it is certain that the reduced use of pesticides achieved through the Programme has had a beneficial effect on the natural environment. The IPM approach has shown that increased diversity of insects in the fields leads to a more stable environment, where pest outbreaks are not necessarily problematic. Consequently, the Farmer Field Schools are reversing the trend of biodiversity erosion at exactly the level where it is needed most: at the farmlands.

In many areas, the overall ecological situation is characterized by a severe loss of natural ecosystems as a consequence of agricultural intensification. Remaining waterways have often reached the biological stage of sewers and are no longer providing water to the local fauna, but are rather a health risk to the rural population. Irrigation, particularly up-stream, has led to

an overuse of river water by farmers in the upper irrigation schemes. In semi-arid areas this has caused migration of coastal farmers, whose ground water resources are gradually replaced by intruding salt water and rendered the arable land un-farmable. In such critical situations, the FFS offers the opportunity for a much broader environmental education. This potential of FFS seems hardly to have been recognised by both donors and the FAO itself. Given the current focus on bio-diversity and agro-biodiversity, this seems an opportunity lost.

## 7. Lessons Learned

The FAO/EU Programme on IPM in Cotton in Asia once again demonstrated the power of a well-conducted Farmer Field School (FFS) to effectively reach small farmers, energise and empower them, and enlist them in the nation's development effort. This effect was observed even in unfavourable policy contexts.

Exposure to a successful ToF, FFS or FFS Alumni Group does not fail to capture the imagination of policy makers, officials and scientists and to convert them for life. The ability of the FFS process to mobilise the typical intended beneficiaries of development such as small farmers and labourers, including disadvantaged rural women, and to transform them into self-confident experts is very convincing. The challenge is to get senior politicians, policy makers and donor administrators to witness 'the miracle' wrought. What counts is that FFS are able to enlist farmers in development and to capture their energy and intelligence for dealing with the complex issues that the countries face today.

The FFS seems an adaptable general educational methodology for a transformation among those usually considered 'hard to reach' in terms their ability to observe and infer, to co-create knowledge, to experiment, to make claims, to organise, to operate under gender equality and to be an entrepreneur. In this respect it is unparalleled compared to other approaches, including demonstrations, general extension, and even PRA, although PRA methods could contribute to FFS quality, as we shall discuss below.

IPM continues to be an excellent entry point for an FFS approach. The experiential discovery learning with respect to insect life cycles, population dynamics, pest-predator relationships, etc., and the immediate and visible income, health and environmental effects of reduced pesticide use, have an impact that spills over to leadership skills, a change in the relationships between men and women, and an ability to stand up to pesticide salesmen, and that elicits a general critical and experimental attitude. In addition, from IPM it is easy to move to catchment management, soil fertility management, etc.

Nevertheless, the focus on IPM and reduced pesticide use detracts from the understanding of the potential of the FFS approach as a general educational method. IPM Programmes run the risks of remaining captive of Plant Protection Departments, Crop Development Programmes, and other limiting institutional contexts that do not allow the flexibility to fully capitalize the potential of the FFS methodology. The emphasis on IPM for a particular crop has apparently also played a major role in the decision of the EU not to finance the second phase of the Programme. It is apparently difficult to realize that IPM and FFS are not the same thing. In the Review Team's meeting with officials, IPM was often equated with the use of Neem, biocides and other technical innovations and life science research topics. It is hard to get the vital *educational* aspect onto people's retinas and to make them realize that the FFS forms an essential bridge between physical aspects of agriculture, environment, and health, on the one hand, and the social processes necessary for realizing them, on the other.

Cotton as a crop is also a good entry point under certain institutional conditions. In all countries visited, cotton is the crop in which most pesticides are used. For example, in India, cotton is grown on only 5% of the total cropped area, but uses 54% of the total pesticide consumption in the country<sup>8</sup>. In Pakistan, 80% of all pesticides used in the country are used

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<sup>8</sup> 200/2001 season figures

on cotton. Not counting labour, pesticides make up a major proportion of input costs in cotton so that IPM methods can quickly lead to income effects. Conversely, when harvests fail, the huge outlays for pesticides lead to farmer indebtedness and, in India, to the dozens of 'pesticide suicides' per week, a cause of political embarrassment. In addition, water and fertilizer use in cotton can easily be improved, so that yield and further environment effects are easy to realise. At the national level, substantial reductions in pesticide use lead to saving of foreign exchange and to reducing production costs of cotton, making the country more competitive in the international market.

Especially in India and Pakistan, the unit cost of a field school was not considered very important. What counted was the cost-effectiveness or the promise of cost-effectiveness. Spending Euro 12 per farmer through the FFS approach is considered more effective than spending Euro 1 per farmer through conventional extension work, simply because of the comparative impact of these approaches.

Notwithstanding the proven and repeatedly demonstrated energizing and mobilizing effects of the FFS, practical use of the FFS as a policy approach remains vulnerable in a number of important respects. The management of these vulnerabilities determines the impact and cost-effectiveness of an FFS approach. The Impact Studies carried out in the different countries, but specially those conducted in India and Pakistan have highlighted the following vulnerabilities:

- (a) *Practice maintenance.* Do alumni keep up Agro-ecosystem Analysis and other practices? Which practices tend to become extinguished? Little is known about this at present so that there is no basis for raising expectations of lasting effects of FFS in terms of qualification and competence (the Programme's calculation of the Internal Rate of Return has used a seemingly conservative estimate of extinction of one year).
- (b) *Multiplier/Diffusion Effects.* The extent to which a multiplier effect can be built into the FFS approach has been a real concern from the start of FFS implementation. So far, the evidence shows that, unless special measures are taken, only the concrete and visible technical elements diffuse unaided, and not the essential understanding and skills (as indeed Everett Rogers' Diffusion of Innovations theory would predict). Such evidence is, for example, provided by the figures generated by the impact assessment study carried out in Pakistan.
- (c) *Actual attendance at FFS and ToF.* The continued tendency to multiply the number of FFS and ToF with 25 to arrive at the number of people trained is untenable. Careful evaluation studies carried out in Pakistan and India have shown that attendance of FFS and ToF can be very erratic and low, partly depending on the composition of the FFS.
- (d) *Formation and Composition of FFS.* How FFS members are selected and how their composition is established remains a mystery in most FFS programmes. Research in India as part of the impact assessment carried by the Programme established that 'normal' procedures tend to lead to very diverse groups that mix large and small farmers, men and women without rhyme or reason. In Pakistan, the impact assessment showed that especially larger and more influential farmers get selected. The selection is not connected to a village-wide process so that future diffusion or scaling up effects cannot be built in. In this connection, the work of the NGO PRDIS in India which deliberately experimented with a PRA phase in selected villages using e.g., wealth

ranking as a basis for the selection of FFS members with and on behalf of the village. It seems that working with the entire community to establish the FFS and select its members is of vital importance for the future diffusion effect of the FFS. In all, working with communities in establishing FFS, attention to composition, maintaining attendance, and other sources of vulnerability should be part of the FFS curriculum, as much as the work with the members of the FFS once the FFS is established.

- (e) *Scaling Up*. Can the impressive effects reached in pilot FFS be replicated on a large scale? The impact of the Programme, especially in Pakistan and India, has led to the decision to make the 'FAO Model' the basis for educating millions of farmers. These plans highlight a number of concrete issues about which a great deal more needs to be known for the FFS approach to come of age. Of special concern is also the ability of large bureaucratic public agencies to make available resources, supplies and emoluments for facilitators in time for seasonal activities, and to invest in quality monitoring and maintenance. Scaling up requires lowering unit costs of ToF and FFS, and asks for reducing what seem to be 'frills', such as refresher courses, monitoring and other devices for quality maintenance.
- (f) *Replicability*. The sudden termination of the funding of the Programme 'showed up' a number of experimental activities that the Programme was funding but which public agencies are unlikely to be able to fund. These include outsourcing of FFS to NGOs, newsletters, special meetings, refresher courses, etc. The Programme also provided flexibility of funding and thus ensured that money was available at moments when it would have been totally impossible for the Government to come across. This issue raises serious questions about the extent to which a Programme should develop perhaps essential but non-replicable features. It also raises questions with respect to the minimum requirements that a government apparatus must satisfy before it can run an effective FFS Programme.
- (g) *Facilitation skills*. The (i) technical and (ii) participatory skills of facilitators remain a major cause for concern. For example, two detailed studies of Bt cotton financed by the FAO/EU IPM in Cotton Regional Programme showed that FFS trainers have little understanding of the technical aspects of Bt cotton and could therefore not help IPM FFS members capture the sizeable benefits associated with combining IPM and Bt varieties. But of even greater concern are the facilitation skills in terms of participatory methods and experiential learning. The IPM/FFS project of CARE in Bangladesh is a case in point. After an initially good start, this NGO project seems to have lost sight of empowerment objectives and reverted to authoritarian technical 'top down' approaches. Refresher courses of IPM FFS facilitators and Farmer Trainers require urgent attention and financing. The current mechanisms for scaling up do not give much reason for hope in this respect. The typical state or province earmarks a given annual amount of its funds for implementing a target number of FFS. This means that the money available will be applied to start up a new set of FFS every year and that very little will be available for follow-up. Without high quality facilitation and high quality of FFS alumni, pesticide companies will find it easy to destroy whatever inroads were made. The only guarantee against these companies and the politicians and officials in their pay is the conviction of farmers that they can actually save money and live healthier lives if they limit pesticide use. Such a conviction requires excellent training and strong group process facilitation.

- (h) *Institutional context.* Implementation of IPM FFS by a government agency asks for special institutional support that has not been given too much thought but that has been made visible as a result of the abrupt end of the Programme and the decision of especially India and Pakistan to continue on a major scale. These aspects include the establishment of positions, job descriptions, and career advancement prospects of staff involved. They include budget procedures, budget slots, and routine procedures. They include organizational implications and reallocation of tasks, titles, assignments, etc. Such changes are not easy to make. For example, the leader of the project in Pakistan has been reassigned to his former post and has not been appointed to lead the envisaged 5-year \$3.3 million IPM Project in Pakistan. There simply is no existing slot for such an appointment.
- (i) *Policy Context.* A relatively ‘soft’ coordination mechanism, such as learning through FFS, needs to be part of a ‘mix’ in which (1) regulation based on hierarchy and (2) economic incentives based on market also play a crucial role. Regulatory frameworks and incentives need to support the educational effort. In some of the countries visited such a mix is absent. In Bangladesh, for example, the existing Pesticide Regulations, which look impressive on paper, are not implemented because the Government does not have the means for it. Meanwhile the incumbent government sees no harm in giving a huge one-time subsidy to farmers for pesticides in the run up before the election. Officials responsible for IPM FFS implementation believe that growing cotton without pesticides is impossible. In Vietnam, farmers receive a credit package of inputs the cost of which is deducted from the proceeds of the farmers’ cotton sale. This package contains pesticides. FFS alumni allegedly do not use these pesticides and sell them on to other farmers. One cannot call this a conducive policy framework. In most countries visited, extension workers and facilitators add to their income by selling or promoting pesticides on behalf of the companies. In Pakistan massive advertising by pesticide companies on TV, newspapers and billboards spread a message that is the opposite of the aims of the National IPM Programme.

In the area of extension and farmer education, a failure leads to the question: Was it the wrong method or the right method wrongly applied? The result in both cases is the same. In the case of the FFS, the repeated experience of the astonishing impact of a well-conducted FFS, ToF, or IPM Club seems to suggest that the FFS approach is the right method, one that fits the current age in which farmers are required to become experts in the adaptive management of complexity. But the risks and vulnerabilities of the method as enumerated above do perhaps not allow such an easy conclusion. There are two possibilities:

- (a) The current FFS does not lend itself for scaling up from small-scale pilots. The method therefore needs to be adapted, simplified and commoditised. This is the option preferred by Feder et al<sup>9</sup>, although there is yet no indication that FFS can be simplified without losing the essential contributions. In this respect the implementation of the

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<sup>9</sup> G. Feder, R. Murgai, and J. Quizon (2003). Sending Farmers Back to School: The Impact of Farmer Field Schools in Indonesia. Washington: World Bank, Policy Research Working Paper 3022, April 2003. The conclusion of this study, i.e. that reductions in pesticide use and increases in yields are no greater among farmers who were exposed to an FFS as compared to their neighbours or ‘controls’, have raised a great deal of debate. The impact measures concerned exactly those simple technical aspects of FFS that DO diffuse easily. Given the virtual saturation and long period of implementation of FFS in Indonesia, and the fact that the ‘controls’ were selected in the few areas remaining where IPM FFS had not been implemented and that were often close to FFS implementation areas, suggests that the results of the Feder et al study could equally well be interpreted to mean that FFS implementation in Indonesia has been a huge success with wide diffusion of the simple messages.

design for scaling up that has been decided upon by the Indian state of Maharashtra merits careful evaluation because it does plan to include a number of seemingly intelligent simplifications.

- (b) The risks and vulnerabilities can be taken care of by preventive measures and procedures. Given the stage of development of the FFS approach these need, however, to be developed by careful field experimentation.

Both (a) and (b) ask for field experiments, monitoring and R&D to ensure progress and further building what the FFS approach has so far achieved.

## 8. Conclusions

### 8.1 Conclusions with respect to the funding situation and Programme follow-up

The Programme has demonstrated that a well-conducted Farmer Field School (FFS) can effectively reach small farmers, including disadvantaged rural women, and affect them positively in terms of knowledge, skills, actual practices, income, empowerment, leadership, entrepreneurship and so forth. In that sense, the FFS can enlist small farmers and women as partners in development efforts.

Some participating countries, Pakistan, India, and to a lesser extent China, have accepted the FFS as the preferred model for the state/farmer interface. They have allocated funds and planned rapid scaling up of the FFS approach. The decisions made by these governments were based on exposure to the success of FFS implemented on a relatively small scale with careful follow-up, quality control, and in conducive framework conditions created by the Programme (e.g., timely delivery of supplies, etc).

The FFS approach has a number of risks and vulnerabilities that can affect its potential large-scale impact. The management of these risks and vulnerabilities has been insufficiently developed and tested to ensure successful scaling up of the FFS approach from the level achieved in the present project. The decision by the EU not to finance the second phase has undermined measures that could have helped the governments concerned to deal with some of the risks and vulnerabilities mentioned.

This situation has created a precarious situation for the FAO. The Programme has been remarkably successful in that 'the FAO approach' has been taken up in a significant way by major countries in the South. But the decision by the EU not to finance the second phase has created a substantial risk that 'the right method is wrongly applied' on a large scale. This would lead to an erosion of confidence in FAO.

This also holds for the EU. It has created the conditions for both the breakthrough achieved by the Programme and the likely shortcomings of the follow-up. A Programme of this nature requires longer than the three years of *de-facto* funding that were available. The Programme has invested a substantial amount of money in training trainers who in some countries subsequently could not practise their new skills because promised money that was necessary for farmer training was not made available.

Given the impact that the Programme has achieved, and given the risks this very impact has created for the future use of the FFS methodology, the EU finds itself in a compromised position that requires careful assessment by the Commission. The Programme has made the EU very visible, especially in South Asia.

The decision by the EU to stop funding the Programme can be explained in part by the fact that its administrative procedures do not allow it to recognise the evolution of a programme. The title and formal goals of the Programme were formulated in 1994, but did not reflect the evolving nature of the Programme. The Mid-Term Review had explicitly pointed out the dangers of this situation. The decision to stop funding, as well as the shortfall in funding during the Programme, had more to do with the nature of donor procedure than with the achievements of the Programme or the opinions of people in developing countries.

## 8.2 Impact in the Programme Countries

IPM can best be considered an *entry point* for farmer training. Especially in China, India and Pakistan, the focus on cotton which accounts by far for most of the pesticides used in these countries proved a good choice because of the immediate environmental, health and income effects that can be achieved. The fact that the Province of Punjab in Pakistan has come on board since the Mid-Term Review can be considered a major achievement.

Of the six countries involved, the Programme is most likely to have left a sustainable impact in India and Pakistan, followed by China. The conditions for a sustainable impact did not prove very conducive in Bangladesh and Vietnam. The sharply reduced acreage under cotton did not make the Philippines an ideal country for a programme in cotton, but the climate for FFS implementation remains positive.

In China, India and Pakistan, Programme activities have become embedded in Government institutions and in NGOs (India and Pakistan). Substantial public funds have been made available for implementation of ToF, FFS and F2FS during the Programme. In all three countries, local funding will continue the activities now that EU funding has ended. However, as argued earlier, sustainability especially in India and Pakistan seems compromised by the pressure on government departments to rapidly scale up the activities.

## 8.3 Achievements

The well-designed impact assessment conducted by the Programme provides evidence that alumni of FFS implemented by the Programme, compared to (i) their pre-FFS scores and (ii) a sample of farmers in remoter control villages, improved their incomes by a third, and reduced pesticide use by nearly 40%. A conservative estimate of the internal rate of return of the project by the Programme is 15%. An independent ADB consultant arrived at a figure of 25% for Pakistan. The Programme seems to have been a good investment for EU development funds.

About 94,000 farmers are estimated to have been trained during the Programme's life time, of whom about 50,000 were trained through Programme funds and the remainder through Governments, especially India, China and Pakistan. As a result, overall training targets were achieved, notwithstanding the severe reduction of funding during the Programme and the termination of the Programme after the first phase that focused especially on training trainers with the hope of cashing in during later phases.

The inclusion of self-observation of health effects of pesticide use has had an important impact on health awareness and practice, especially among women. The success in cotton has inspired countries to undertake FFS in other crops and entire cropping systems.

## 8.4 Programme Management

The Regional component of the Programme has been uniformly appreciated in the countries visited, for its leadership and expertise, for the support to impact assessment and quality

monitoring, for the exchange of views among countries through Regional workshops and the exposure to international experience, and, not in the least, for the flexibility in funding the Programme provided in countries with bureaucratic financial procedures.

The Programme has deliberately stimulated countries to build their own project and refrained from telling them how it should be done. As a result, in countries there is a great deal of ownership, initiative and commitment. However, the plans for rapid and massive scaling up that are in place in some Programme countries would benefit greatly from regional guidance, monitoring, experimentation and safety net arrangements.

The contributions of the FAO Representations in the Programme countries have been variable, ranging from highly supportive to indifferent to obstructive. Where the Programme has been most supported by the FAO Representations, it has been most successful.

The flexible availability of funding through FAO has been one of the success factors of the Programme. For this reason, in Pakistan, FAO has also acted as a conduit for the ADB and Arab Gulf Fund contributions to the National IPM Project.

### **8.5 Farmer training and Facilitation**

One of the immediate objectives of the Programme was to develop a cadre of facilitators out of the existing extension staff. The Programme has given considerable emphasis to developing this cadre and invested a great deal of funds in this activity in anticipation of the second phase. The facilitators trained have played important roles and the Review Team has the impression that the care and attention paid to facilitator training have paid off.

In all countries the training of facilitators in ToF and RToF exceeded the set targets. In India and Pakistan in particular, the government contributed generously to the crucial training of their field staff and also included NGO staff as course participants. Training of Farmer Facilitators through FToF was implemented in all countries except the Philippines, starting in 2000 with Vietnam. The number of FFS/F2FS was slightly lower than targeted. This was mainly due to the fact that in most countries facilitators had to be trained from zero with as consequence that the ambitious numbers set for the first few Programme years could not be achieved. However, especially India and Pakistan caught up enormously and surpassed their targets.

Studies in Pakistan and India have revealed that FFS are variable in terms of composition, attendance, diffusion of content to fellow villagers, etc. Careful experiments with improving the quality of training and facilitation are essential for taking the FFS approach further. The Review Team feels that quality monitoring is one area in which the Programme has made a really innovative contribution.

### **8.6 Research Linkage**

Considerable attention was paid to farmer research and to links between formal research and the Programme activities. In most countries, researchers from universities and research stations were invited to contribute to curriculum development. In Pakistan the whole National IPM Programme is part of the Pakistan Agricultural Research Centre. The Programme also

has been active in stimulating farmer research. But using farmer research as part of the national agricultural research effort is still not accepted and no attempts were made to involve FFS groups in identifying research topics and priorities for national research, and to ensure that scientific research efforts are not only based on the scientific literature and methods but also on the needs, possibilities and circumstances of the farmers for whom the research is intended<sup>10</sup>.

## 8.7 Policy Context

The strategy to use impact assessment to convincing policy makers of the approach could not be implemented because of premature termination of the Programme funding.

With the exception of Pakistan, where a National IPM Programme is in place and where pesticide policy has been the subject of special attention, there was not much evidence that effective pesticide regulations were in place in the Programme countries to support IPM training. In most countries, a combination of factors seems to make effective regulation virtually impossible for the time being. The major objective of the Programme to reorient national policies on plant protection seems to have been rather unrealistic.

## 8.8 Institutional Sustainability

The Programme reflects the increasing coming of age of the FFS 'movement' in that it has introduced and/or experimented with ways of dealing with some of the risks and vulnerabilities enumerated earlier. The following points can be specifically singled out in this respect.

- (a) *Impact Assessment*. One of the most important ways in which the Programme has moved forward the FFS approach is the building Impact Assessment into the Programme. Of course, this approach has not been equally successful everywhere. In the Philippines, the attempt was dropped after the baseline. The Chinese seem little interested in completing the exercise now the funding has stopped. In some other countries. In both Pakistan and India, impact assessment has been built into the national effort that is going on after the termination of the Programme.
- (b) *Institutionalisation of Quality Monitoring*. The Programme has pioneered procedures by which the quality aspects of ToF, FFS, alumni groups, refresher courses, etc. can be monitored. In India, the State of Karnataka has established posts for monitoring facilitators at the District level who have the task of ensuring that data are kept and collated at higher levels, whilst also ensuring that inputs, supplies, and facilitators are available when required and helping facilitators who have difficulties getting groups going, etc. This is a very interesting initiative that merits evaluation. In Pakistan records have been designed by which facilitators can monitor vital aspects of performance that can also be aggregated for monitoring results at the central level.

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<sup>10</sup> A project, Convergence of Sciences, underway in Benin and Ghana in West Africa with funding from Wageningen University, DGIS (Dutch Development Assistance), the FAO/GIF in Rome and the Netherlands Scientific Organisation, has built a diagnostic phase into 8 agricultural research projects. The lessons learned from this experiment are in press (to appear in the Netherlands Journal of Life Sciences (NJAS) at the end of 2004).

- (c) *Involving NGOs and other private parties by outsourcing follow-up and facilitation of alumni groups.* In India alumni groups have been registered as self-help groups, a recognised type of organisation that can make use of State sponsored programmes. In Pakistan and Bangladesh, facilitators have formed associations and NGOs in their own right so as to be able to attract contracts for government work. Maharashtra foresees the use of entrepreneurs who will be (i) paid to carry out ToF and FFS, and (ii) stimulated to start up commercial businesses for supplying farmers with bio-pesticides and organic pesticides.
- (d) *Experimentation with linking PRA and FFS.* As mentioned earlier, PRDIS has experimented with using village-wide PRA methods for constituting FFS groups and for ensuring that the FFS benefits the entire village. It is worth evaluating the effects on group process, diffusion and group composition very carefully.

Sustainability will ultimately depend on the effectiveness and fidelity with which the pilot experiences can be scaled up. Unfortunately, funds for refresher training, monitoring, external guidance and support, etc. are no longer available.

### **8.9 Gender**

The Programme has made a serious effort to include women. It has contributed to a greater recognition of the significant roles women play in cotton production, and in the extent to which they therefore suffer from exposure to pesticides.

Particularly in South Asia, where gender issues are significant, the Programme has shown that FFS are capable of giving women a voice and of mobilising women's energy and concerted action.

### **8.10 Environment**

The Review Team is convinced that the Programme has led to substantial environmental gains through reduced pesticide use. According to calculations, the amount that would otherwise have been used was 1,600 tons on 250,000 ha.

Environmental effects are also realised by the fact that the FFS curriculum pays attention to more rational use of fertilisers. New experiments are also underway with FFS that pay attention to rational use of irrigation water.

The IPM concept needs to widen, to provide scope e.g., for 'weeds', and to move out of the farmer's field where watersheds, irrigation ditches, etc., provide important habitats for a much wider flora and fauna. The concept needs to include birds and lizards as important predators. This widening of the concept is of vital importance in biodiversity protection, and ultimately to ensure a healthy reserve of beneficial insects and birds for IPM purposes.

### **8.11 Impact Assessment**

At the time of the Final Programme Review, the impact assessment studies were in different stages of completion. Nevertheless a set of convincing comparative data could be presented and was published in the last issue of the Programme's Newsletter. A further six months of

work by the Regional Impact Assessment Specialist would ensure that a comparative impact assessment of acceptable scientific quality could be published in a refereed journal.

The focus on impact assessment and quality monitoring, has led to a new understanding of the risks and vulnerabilities of ToF and FFS, especially when scaled up from successful and convincing pilots. It has made a credible albeit conservative effort to estimate its internal rate of return.

Part of the design of the impact assessment was a final impact measure after a number of years. This measure would provide a diachronic data set including the baseline, the first impact measurement after a year and the third impact measure after a few years. Completing the last impact measurement will provide important further insight into the impact of Farmer Field Schools, now contested on the basis of one longitudinal study of rice FFS in Indonesia.

## 9. Recommendations

### 9.1 For the remaining period of the GCP/RAS/164/EC Programme:

1. In view of the need to assist member countries in planning post-Programme follow-up and due to requirements for final project reporting and financial closure, it is recommended that the essential Bangkok-based Programme staff (CTA, Impact Assessment Specialist and three General Service staff) should have their contracts extended until 31 December 2004, within the existing budget.

### 9.2 Short-term recommendations to FAO

2. Given the decision by the EU to stop funding the Programme, coupled with the enthusiasm the Programme has generated among the participating countries, FAO is urged to devise a strategy to develop alternative scenarios for the development of FFS and IPM in the countries, taking into account available resources from FAO as well as those that may be available from donors.
3. FAO's Director General is urged to address the European Commission at the appropriate level to discuss the situation that has arisen as a result of the decision to stop funding the Programme and the circumstances surrounding it. As part of the discussion, it is recommended that the EU should be asked to support an assistance package that has as a minimum the following elements:
  - Completion the impact assessment exercise to a level where the effects of the Programme can be empirically supported and credibly presented;
  - Regional Technical Assistance to the Governments in China, India and Pakistan, through policy support, quality monitoring, institutional embedding of scaling up of cost-effective FFS implementation, as well as through experimental development of modalities for outsourcing and other forms of public/private partnerships.
  - A flexible grant fund that can be used in India and Pakistan to promote instalment of the FFS as the mainstream development interface between rural communities, and the public and private sectors. FAO should be the conduit for this fund so as to ensure its flexible deployment.
  - The proposal for the Biodiversity Programme in China.
  - The proposal for collaboration with ASEAN countries.

### 9.3 Medium-term Recommendations to FAO

4. FAO is urged to take seriously the shift by donors away from production agriculture, and towards poverty alleviation, biodiversity and other Millennium Development Goals, by adapting its image and identity, especially by emphasising natural resources and ecological services (e.g., water and soil management, agro-biodiversity).
5. FAO is urged to recognise that members of the agriculture and rural development communities are insufficiently aware of the FFS as the 'active ingredient' in IPM and, potentially, in other programmes promoting rural people's empowerment and expertise in the management of biodiversity, water, health, and other MDGs. FFS is one of the few models for farmer education available to developing countries. The FAO is urged to give more publicity to the versatility and potential of the FFS.

6. FAO is urged to put together a research agenda for developing the FFS approach, not only from the perspective of farmer and facilitator training, but especially also for training managers, administrators and decision makers in the public sector, donor agencies, NGOs, and interested companies in creating conducive institutional and policy contexts for large scale FFS implementation. Outcomes of such research should be used for curricula for ‘upstream ToF’.
7. FAO is urged to put together a consortium of expert rural development NGOs to experiment with ways to manage the specific risks and vulnerabilities of the FFS so as to make it more robust and cost-effective.

#### 9.4 Longer-term Future Directions

FAO’s FFS approach should be a source of relevant policy advice and assistance of its implementation at all vertical levels. This requires the following changes:

*1. Image change:* Donor funding has reached a level of development and project fatigue. It is now argued that more effective assistance takes the forms of policy advice, sector approaches, and basket funding. In this scenario, an FAO approach based on single crops, or IPM stands no chance of being funded. It is therefore strongly suggested that FAO brings to bear the FFS approach on

- Ecosystems and biodiversity management (including non-agricultural areas),
- Environmental and health education,
- Poverty reduction,
- Local empowerment and good governance, and
- Strengthening civil society.

Vertical feedback mechanisms need to be incorporated and be strong enough to meet policy advice requirements.

*2. New approaches and conceptual change:*

- Make Policy Advice the entry point: new programmes need to focus on policy advice at the highest political level. The FFS experience can then be used to test the new policies at field level and provide feedback to policy makers.
- Support trade, international agreements and return mechanisms: emphasize industrial production lines, which – through the FAO approach - are starting on environmentally friendly basis adhering to the Kyoto Protocol and the Biodiversity Convention.
- Delete “IPM” and “Cotton” from presentations, representations, banners, advertisements, newsletters, and any document, which is used to win partners for future collaboration.
- Foresee changes likely to be triggered by effects of global warming and start preparing farmers through test introductions of new crops and varieties, which are more suitable to the specific changes occurring in the region. This will contribute to social stability.
- Systematically open the Farmer Field Schools to other organisations through joint implementation agreements to achieve highest impact on a wider area of themes.

*3. EU-Cooperation:* FAO, as a UN organization, is in the advantageous position to run EU projects on the basis of direct contracts with simplified administrative procedures. As the

EU's decentralisation process puts additional responsibility on the Delegations, a direct contract to an UN organisation lessens administrative burdens and shortens the time otherwise needed for tendering. The latter is an important aspect since funds for which disbursement has not started within a given time (usually one year) after signing the Agreement will revert to Brussels under the new regulations. This situation should be exploited to the fullest. For a future programme on ecosystems management, the following two options should both be pursued for optimal synergy:

- *Regional Programme.* Components of Asia-wide approaches that are regional in nature (e.g., conferences, coordination, specific region-wide activities etc.) should be submitted for funding under the AsiaProEco (or research) budget line.
- *National Programmes.* As a consequence of the decentralisation process, the Delegations are now given the mandate to decide and administer national programmes more independently from Brussels than before. This opens opportunities for national programmes, which, however, have to fit the National Indicative Programmes (NIP) of the EU with the respective countries.

Immediate opportunities arise in:

*China:* a call for proposals for an EU-China Biodiversity Protection Programme will tentatively be launched in early 2005. A proposal on Agro-Biodiversity Protection, if possible in partnership with the German Government through GTZ, is a realistic opportunity. EU will be funding up to 50% of the total support needed to a maximum contribution of €5 million. Attention has to be given to the fact that matching funds need to be either from non-EU organisations and/or special national project funds (not the national budget funds for recurrent expenditure). The timing requires a concerted proposal, which synergises the FAO with the GTZ approach, by early 2005.

*India:* The new NIP 2006 will focus on crosscutting issues in the following three areas: Environment (first priority), Women's health, and Education. The Farmer Field Schools are in fact cutting across these three themes. A proposal has to take into consideration that the EU in India will work on a State Partnership Approach with Rajasthan and Chhatisgarh. The formulation mission team has taken up work and it is essential that inputs to their report have to be delivered before the middle of September this year.

For *other countries* it will be important to know the NIP priority areas for cooperation and to feed in FAO options for new project concepts still within this summer as the NIP 2006 is under preparation right now.

## **Country reports**

## **Bangladesh**

### **Acknowledgements**

The RT wishes to express its gratitude to the people who were instrumental in making its visit successful. We would like to particularly thank Ms Alma Linda Morales Abubakar, the Cotton IPM Country Officer; the FAO Representative, Ms Bui Thi Lan; Mr. Md Abdul Baten, the Executive Director of the Cotton Development Board; Mr Md Akhteruzzaman, the Deputy Director of the CDB in Jessore and his many staff that we met; Messrs Ekramul Ahsan and Md Arham Uddin Siddique of the EU delegation and Mr Hafiz, our driver who proved exceptionally resourceful and well-informed.

### **Relevance of the project to national priorities and needs**

American cotton (*Gossypium hirsutum*) was only introduced into Bangladesh in 1985 through the use of American seed. *Gossypium arboreum* has been produced in Bangladesh's hilly areas since time immemorial. The latter variety is resistant to most diseases and tolerant to insects. Its yield is as low as 190 kg/ha and it is a short staple variety. Its main use is for religious purposes. The American variety is susceptible to disease and pest damage. The crop uses 80% of all pesticides used in the country. Yields are about 1100 kg/ha. The two varieties do not interbreed.

*Arboreum* covers 13,000 ha, largely as a mixed crop. *Hirsutum* is now grown on about 38,000 ha (0.7% of the cropped area), except in flood years (such as 2004) when the harvested acreage is halved. The Cotton Development Board is under pressure to increase the acreage. The national production of American cotton is about 15% of the country's needs, which include those of the large garment export industry. Most of the cotton required for this industry is imported although the quality of the local cotton is apparently so good that it is mixed with the imported cotton. The future of the garment industry in Bangladesh is uncertain because competition from China might well make garment production in Bangladesh unfeasible after the expiration of the Multi Fibre Agreement in 2005.

Farmers get low prices for their cotton. Marketing is not well organised and the roles of the CDB and private ginneries are not always clearly separated. Farmers with irrigation are unlikely to grow cotton since vegetables and other crops are much more lucrative. Cotton requires two seasons and clashes with the main rice-growing season. The area in which farmers opt for cotton is relatively small. The scope for cotton expansion under present conditions therefore is also relatively small.

Subsidies are presently being made available for (1) Gaucho-coated seeds (which allegedly prevent damage by sucking insects for the first 30 days), (2) knapsack sprayers and (3) pesticides<sup>11</sup>. It seems that there is a general consensus among officials that cotton cannot be grown without pesticides. But there also seems to be a consensus that the amount of pesticides imported into the country needs to be reduced to save foreign exchange and that the frequency

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<sup>11</sup> Opponents claim that destroying relatively harmless sucking insects in the early stage of the crop will not allow natural enemy populations to build up, thus necessitating more spraying against American and Pink Boll Worm later.

of spraying by farmers must be reduced for reasons of environmental and human health and poverty reduction.

National Bangladesh pesticide regulation exists since 1992 but implementation is hampered by effective controls on the ground.

IPM in cotton is only the latest of IPM efforts in the country, the earlier ones focused rice and vegetables. IPM FFS in the latter two subjects are pursued not only by the GoB but also by NGOs such as CARE <sup>12</sup>, and donors such as DANIDA. The FAO-EU Cotton IPM in Asia Project has benefited from this previous work and the first borrowing three facilitators from the rice IPM programme in 2001.

The RT concluded that the production of *G. hirsutum* is not very lucrative for the small-scale farmers Bangladesh who were the intended target audience for the project. The project could demonstrate that farmers can reduce their pesticide use, increase their yields, change gender roles, and mobilise people's energies towards entrepreneurial activities. But the chances that the GoB would be able to support such developments on a large scale were small and the entry point of cotton, given the production focus of the CDB, was not a good choice.

### **Project Operation and Design**

The project is implemented under the auspices of the CDB, which has a commodity focus that is not necessarily consonant with the project focus on poverty alleviation. The international Project Officer for Bangladesh is assigned to the CDB. There is a National IPM Programme but the RT has not seen much evidence that it plays an important role in relation to cotton IPM activities. The link with the CDB prohibits spill-over of IPM activities to other crops or sectors.

The prospects for continuing activities by the GoB are small. The CDB has some funds for training but it will not be easy to divert these from the intended 3-day extension meetings and with the premature termination of the FAO/EU Programme there will be no impetus for further development.

### **Status of project implementation**

The project started late, partly due to delays in signing the necessary documents. The project has only been active in the field during two years (2002-03). Because of the EU's decision not to provide originally promised additional funds and no programmed national funds, there were no project activities in 2004. As a result, the targets for the Project were not reached. Project efficiency was hampered because, due to arguments between FAO and the GoB about who should pay the tax on the car, it was not released until 2003. Fortunately, the Country IPM Officer drove her own car and hired cars for the field visits.

By the end of 2003, a total of 103 IPM facilitators (12 women), comprising field staff and officers from the Cotton Development Board and from a local NGO had been trained in three project funded season long ToF courses. In addition the project financed 5 FToFs, which

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<sup>12</sup> The impact of this work seems to be mixed, see Andrew Bartlett (2004) Entry Points for Empowerment, Report for CARE Bangladesh. The report implicitly emphasises the fact the FFS implementation by CARE has slipped especially where facilitation skills are concerned. FAO trained the first facilitators for CARE, but apparently all these people have since left.

trained 90 IPM FFS alumni (16 women) as Farmer Facilitators. A total of 148 FFS and F2FS were carried out: 15 as Practice FFS, 100 regular FFS, 30 Practice F2FS and 3 F2FS. All were project funded. The first FFS were in 2001 and F2FS began in 2002. As training capacity developed, the number of FFS/F2FS increased from 23 in 2001 to 638 in 2003. The total number of graduates is 3,700 (884 women).

The curricula for ToF, FToF and FFS were designed in a 'Planning meeting' with CDB and DOAE staff and three facilitator 'preparation workshops' in 2001. It was revised annually in facilitator refresher and planning workshops, where technical and facilitation skills of the IPM facilitators were addressed. FFS report writing was improved through zonal 'write shops' for Facilitators.

The National IPM Expert Facilitators (CDB) monitored IPM facilitators, but was not clear whether a fixed format/checklist was used in this.

Bangabandhu Sheikh Mujibur Rahman Agricultural University was contracted for the impact assessment. A pre-training survey was completed in early 2003; the post-training survey was done during the 2003 cotton season. The report has not been submitted yet.

In 2004 there were Farmer Clubs in 35 IPM villages. Legal registration of the clubs is not yet possible. Some clubs are Farmer Research Groups; others are also engaged in socio-economic activities. The club members, all FFS/F2FS alumni, meet weekly and may pay a nominal membership fee. Club funds are kept by the Club Committee and put in a joint bank account in the names of two club members. Activities undertaken by the clubs include:

- Conduct of 'formal' (by Farmer Trainer club members) and 'informal' F2FS;
- Promotion of sustainable agriculture, including soil conservation and improvement;
- Field research on cotton and other crops;
- Income generating activities, e.g. communal cotton production;
- Social welfare such as improvement sanitation and literacy classes;
- Micro credits

In 2003 the Cotton IPM Programme organized a regional Farmers' Congress and a national Policy Seminar to bring together stakeholders and highlight the accomplishments of FFS farmer alumni and to initiate discussions on how the Programme can be sustained.

Field studies were carried out in the ToFs, FFS and by farmer alumni groups and were related to different aspects of cotton production. Special studies carried out by the project were

- a study of the biodiversity in American- and tree cotton (Bangladesh Agricultural Research Institute), together with farmers;
- a cropping pattern study off-season crops (by 2 farmer research groups);
- a F2F IPM health study, aiming to collect information on the magnitude of pesticide poisoning. Fourteen IPM FFS alumni trained to collect data, write reports and to educate other farmers and communities on the health risks of pesticides conducted village meetings on the pilot exercise;
- composting with farmer groups in four zones, in cooperation with an NGO. This topic was added to the FFS curriculum. Some groups were involved in 'commercial' compost production, through revolving funds.

## **Project results**

Due to the late start and early ending of the field activities, the project was only partly able to meet the training targets as set in the Project Document. It financed 3 ToFs (vs. 2 target) and also funded 5 FToFs. The project paid for the implementation of 148 FFS/F2FS (vs. 390 target).

Few women were trained as facilitators (12% of the IPM Facilitators, 18% of the Farmer Facilitators), but female participation in FFS/F2FS increased over the 3 years from 18 to 26%. The percentage of women in F2FS was slightly higher than in FFS. NGO involvement increased the percentage of women trained as facilitators, but had no substantial influence on participation of women in FFS/F2FS. To stimulate women's participation, some FFS were held exclusively for women. Even though the percentage of female participants was low, the impact on those participating was impressive in terms of knowledge, self-confidence, social skills and entrepreneurial initiatives.

The mission visited 2 IPM Farmer Clubs; one formed after the 2001/02 FFS and the other a year later. Both groups extended the IPM knowledge gained in the cotton FFS to other crops (vegetables, rice). The older group also embarked on other farm activities and had future plans of activities generally associated with a farmers' cooperative: micro-credit, purchase of farm implements to be used by members, delay of sale of cotton harvest (to fetch higher prices). This group also embarked on a communal dairy farm, managed by one of the members (who received payment for his labour inputs). The enthusiasm of the members was heartening, but there is a risk that the most progressive and entrepreneurial members would dominate the club. Interviewed female farmers in the two Clubs visited by the mission preferred mixed groups in order to learn from each other and improve mutual respect<sup>13</sup>.

## **Sustainability at the national level**

Farm families in the lowlands treat cotton as a lower priority because other cash crops (rice, sugarcane, jute) bring more income. The large fluctuations in the harvest (up to 50% less in heavy flood years) are destabilizing to the local market. As most cotton for the processing industry is imported and the local cotton, while of good quality, does not meet the technical requirements of the machinery, it is likely that *G. hirsutum* will play a minor role in Bangladesh's future economy, particularly when WTO rules will be applied fully.

This may be different with the hill tribes of northern Bangladesh, where traditional cotton production and processing is part of the local culture.

Much of the management of cotton at national level (import, pricing, purchase from farmers, pest control) is quite strongly controlled by the Cotton Board. This has disconnected farmers from playing an active role in marketing and has limited potential benefits during times of higher world market prices. The Cotton Board does not seem inclined to continue the support to the IPM approach from its own funding.

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<sup>13</sup> Some of these women had been members of an all-women FFS.

## Recommendations

1. Because there is little future in Bangladesh for the further development of *hirsutum* cotton, the RT recommends that serious efforts be made to develop the existing *arboreum* production in the hills and to experiment with other species, such as Kapok.
2. The GOB should withdraw the subsidies on Gaucho-coated seeds, sprayers and pesticides. These subsidies undo everything the FAO/EU Project has achieved in terms of pesticide use reduction. Even the alumni clubs were using Gaucho-coated seeds.

## People met

Ms Alma Linda C. Morales Abubakar, Cotton IPM Country Officer for the FAO/EU Regional Programme in Cotton IPM.

Mr Hafiz, FAO/EU Project Driver, data processor and information manager

Mr Ekramul Ahsan, Delegation of the European Commission in Bangladesh, Dhaka.

Mr Md Arham Uddin Siddique, Senior Engineer, Delegation of the European Commission in Bangladesh, Dhaka.

Ms Bui Thi Lan, FAO Representative for Bangladesh, Dhaka.

Mr Md Abdul Baten, Executive Director, Cotton Development Board in Dhaka.

Mr Abdur Raquib, Chief Cotton Development Officer, Dhaka

Mr Md Akhteruzzaman, Deputy Director CDB, Jessore.

Mr Rafiqul Islam, Chief Cotton Development Officer, Jessore.

Mr Ahamul Kabir, Cotton Development Officer, Jessore.

Mr Narun Nabi, Unit Officer, Jessore.

Mr Aubar Rahman, Assistant Cotton Development Officer, Jessore.

Ms Sajada Akhter, Assistant Cotton Development Officer, Jessore.

Members and Facilitators of IPM Alumni Clubs in Kolaidanga in Chuadanga, and Pragpur in Kushtia.

## **China**

### **Acknowledgements**

The Mission is highly thankful to Dr. J. Y. Xia, Director-General NATESC, Ministry of Agriculture, for his hospitality, making logistical arrangements for the visiting team and for a comprehensive presentation of the project's activities; and to Mr. Wang Ming Yong, Director of the Plant Protection Station of Anhui Province for very warm hospitality, comprehensive arrangements for the field visit, sharing information and ideas and useful discussion. Special thanks go to Mr. Bao Wenxin, Chief Agronomist of the Plant Protection Station of Anhui Province, Ms Cao Huihui, Plant Protection Station of Anhui Province and Ms. Guo Rong, Agronomist, Division of Pest Control, NATESC for coordinating and taking care of the team throughout the visit; to the farmers and facilitators who arranged the field activity; and to the Governor of the Guichi County for his hospitality and interest in the mission's visit.

### **Relevance of the Project to national priorities and need**

Cotton is a significant crop in China and is used as a raw material for its textile industry, which consumes much of the world's production. Consumption of cotton in China (mainland) is expected to reach 7.4 million tons in 2004-05, up 400,000 tons from 2003-04. The country is actively developing cotton production and is at the forefront of Asian cotton research with development and deployment of hybrid and transgenic varieties. As a result continuous gains have been obtained in unit yield.

However a decline in area has occurred since the 90's in the major cotton producing area along the Yellow and Yangtse Rivers, due to problems with cotton insect pests especially bollworm. Pesticide applications rose and have remained very high, often over 20 sprays per season. As a result, cotton production has expanded greatly in recent years in western China (Xinjiang). A strong base in research on biological control for cotton pests and existence of experience with FFS in rice, vegetables and to a limited extent in cotton at the national level has provided effective basic support to deal with the situation through farmer education in ecosystem based pest management

The project is thus considered very relevant for China as it contributes to the development of sustainable and more profitable cotton production through education at the farmer level in IPM in the Yellow and Yangtse River regions and in other regions where pest problems threaten the viability of production. Concomitant reduction in pesticide use is relevant in terms of environmental pollution, improved health of farming communities and WTO regimes that come into force in 2005.

### **Project operation and design**

The project is implemented by the National Agricultural Technical and Extension Services (NATESC) within the Ministry of Agriculture. It is reported that NATESC coordinates with Plant Protection Services in the Provinces and the Counties. A National IPM Committee, Provincial IPM Committees and County IPM Committees oversee the IPM activities at national, provincial and county levels, respectively. The project activities are through a PMU established in NATESC. From March 2001, an international IPM officer was attached to the project, however, since his retirement in 2003 the project has been looked after directly by the PGMU in Bangkok. The project staff also includes a national consultant (mostly to support

ToF and FFS activities in the field). An Administrative Assistant and Technical Officer have been seconded to the project by NATESC. From a sustainability perspective, the project appears to be well embedded in the National Programme implementation structure as FFS have been co-financed since from the start of the project and fully financed from local sources in the last year.

Project efforts are concentrated on three provinces: Shandong, Anhui and Hubei, though limited activities were also taken up in Henan and (in 2002) Sichuan Provinces. The project focused in the first instance on training extension staff as facilitators and holding of FFS. Having realised the limitations of extension-facilitated FFS to reach a critical mass of farmers, emphasis has been given to farmer-conducted FFS as a long-term strategy since 2002.

### **Status of Project implementation**

The project has implemented its programme very effectively. Over the five-year period, 245 provincial and local extension staff has been trained in 8 ToF. The capacity of 60 extension staff has been enhanced through 3 RToF's. A total of 1061 FFS/F2FS were held, of these 645 were financed by the project while 416 were co-financed by national sources; 30,983 farmers graduated from these FFS/F2FS trainings. In 15 FToF's held, 197 Farmer Facilitators have been trained. National planning and review meetings were held annually. Two curriculum development workshops for ToF have been held annually; in addition, a curriculum development workshop was held on coloured cotton in 2003 in Sichuan. In order to exchange experiences, cross-province and intra-province visits have been carried out annually for 2-3 days each. The project also funded an English language training course for facilitators.

Because of the extensive area planted to Bt cotton in China, an important part of the project has been to conduct farmer research on the performance of Bt cotton, as compared to regular cotton. It has also assisted in research conducted by a Ph.D. student on "Economics of Resistance Management – a study of Bt cotton in China".

To understand the economic, social, ecological and environmental health and human resource development benefits of Farmer Field School approach, an impact assessment study has been carried out, as in other participating countries, at three locations: Yincheng in Hubei Province, Lingxian in Shandong Province and Dongzhi in Anhui Province.

Besides the national activities, China hosted the 2002 Programme Steering Committee meeting (8-14 September, Chizhou City, Anhui Province) for representatives of all six of the cotton IPM countries.

### **Project results to date**

The project has established a strong team of facilitators and has further enhanced their capacity. An important hallmark of training has been the young age and gender balance of facilitators. Science by farmers has been a major component of curriculum in the ToF's. Other main focus areas were team building and management skills. Farmer education in IPM has resulted in reducing sprays from around 12 to 7 per season, both for farmers directly participating in FFS and their neighbours, and in consistent improvements in income relative to farmers who have not been exposed to FFS.

Farmer research shows that Bt cotton reduces the need for sprays against bollworm and thereby complements IPM, but it may not contribute substantially to profitability due to increased seed cost, with little seed-cotton yield gain (perhaps no gain when lower ginning outturn for Bt varieties—both for Monsanto and other new Chinese varieties—is considered). An independent study, in co-operation with Hannover University suggests the importance of seed quality in the gain that can be achieved from Bt cotton. Normal farmer practice, with saved seed and purchase of low-priced new Bt seed, may lead to use of varieties with substantially reduced Bt power in controlling bollworms. This study also shows Bt varieties alone without IPM do not always lead to a lower number of sprays and that high quality seed with no sprays can result in only average yields.

Results of impact assessment study showed a significant gross margin increase in Shandong and Hubei provinces but not in Anhui Province; it was suggested to the RT that adoption of Bt cotton during the study period by farmers has confounded the effects of IPM training in Anhui. The internal rate of return in Shandong and Hubei is calculated at 35 and more than 100 % respectively while in Anhui it is less than 1%. The PGMU in Bangkok is attempting to review the data in view of the great variety of results in the three provinces.

Farmer co-operation and communication with extension workers appears to be enhanced by farmer involvement in research in FFS. The Mid-Term Review Team endorsed the emphasis given to farmer-to-farmer training and recommended that performance of F2FS be specifically compared to conventional FFS training. Although no such formal analysis took place, the discussion with the national and project staff, and farmers shows that farmer-to-farmer training is considered equal or superior in quality to extension-facilitated FFS.

### **Sustainability at the national level**

Substantial commitment of provincial and local governments to co-financing FFS throughout the project period is a strong indication of national interest in IPM implementation. Already in 2004, due to the unexpected termination of the project, all FFS were funded through national resources. Discussions with County Government officials, head of Provincial Plant Protection services of Anhui Province and the Director General NATESC indicate that there is a commitment to continue the programme after the conclusion of the project. For instance, in Anhui Province, an amount of Yuan 1 million will be earmarked for FFS in 2005 from the Provincial Agricultural Development Fund with increasing amounts in subsequent years. However, continuation of donor support is considered important to allow the flow of technical assistance from the region. Farmers from FFS have considerable interest to extend IPM methods into other crops, and to get more training for this.

Discussion with the EU Delegation in China indicated a strong support for a follow up bilateral programme on agro-biodiversity that incorporates the FFS model as part of farmer education.

### **People met**

Dr. Xia Jingyuan, National IPM Programme Coordinator, Director General, NATESC, Ministry of Agriculture

Mr. Wang Ming Yong, Director, Senior Agronomist, Plant Protection Station, Anhui Province

Mr. Tao Fayon, Governor, Guichi District

Mr. Zha Tafu, Vice Chairman, Anhui Agricultural Committee

Mr. Liu Chunsheng, Agro-Tech extension centre, Guichi County  
Mr. Wang Zugen, Director, Agricultural Committee  
Ms. Cao HuiHui, Plant Protection Station, Anhui Province  
Ms. Guo Rong, National Agro-tech Extension & Service Centre, Ministry of Agriculture  
Mr. Bao Wenxin, Chief Agronomist, Plant Protection Station, Anhui Province  
Mr. Liu Daogin, Plant Protection Station, Guichi Province  
Mr. Cai Chunhe, DIC, Ministry of Agriculture  
Mr. Sven Ernedal, First Secretary, European delegation, Beijing  
Mr. Richard Hardiman, Project Officer, Development and Cooperation, European delegation, Beijing

## **India**

### **Acknowledgements**

The RT wishes to express its gratitude to the Cotton IPM Country Officer, Dr Palaniswamy Pachagounder and his Administrative Assistant, Mr. Venkatakrishnan, who organized an effective programme for the visit.

The RT wishes to thank Mr Ashish Bahunguna, IAS, the Joint Secretary of the Ministry of Agriculture, GOI, New Delhi, and his staff for warmly receiving us. It also wishes to thank Dr D. Gustafson, the FAO Representative in New Delhi, Mr Andrew Headly, the First Counsellor Development Cooperation of the EU Delegation and Ms Kulan Amin, Development Advisor. We are grateful to Dr A. Rajanna, the Additional Director of Agriculture of Karnataka at Bangalore, and the Joint Director of Agriculture, Dharwad District, for helping to organise and accompanying the team during its field visit. We thank Prof. S. Venku Reddy of PRDI in Hyderabad who came to Bangalore to tell us about his very interesting field experiments, Mr Dilip Chinnakonda of ETC, and Messrs Arun Chandra and Gijis Spoor of the Solidaridad/ETC organic cotton programme.

The RT was grateful for the warm welcome from the four Alumni Groups and the facilitators of the villages of Govankoppa, Pudakkalkatti, Garag and Madhanbhavi, who convened in the first named village to inform us of their activities.

### **Relevance of the project to national priorities and needs**

India has the largest number of cotton growers in the world and ranks third in global cotton production after the USA and China. Its low yields are reflected in the fact that it accounts for about 21% of the world's cotton growing area, but only for 11% of global production. About 5% of the cropped area was devoted to cotton in 2002-2003, amounting to a total of 7.5 million ha, of which two-thirds are rain fed, and one-third irrigated. Irrigated cotton is mainly found in the Northern states of Punjab and Haryana. The Programme focused mainly on the three major rain fed cotton-growing states in the South: Maharashtra, Andhra Pradesh and Karnataka. India produces a total of about between 1.6 and 2 million tons of lint and still imports between 200,000-400,000 tons to satisfy domestic consumption of 2.2 million tons.

Much of India's cotton is transformed into garments, which are India's major export. The GoI is strongly promoting this export and plans introduction of special labels and brands. Exports of ready-made garments to quota countries (mainly EU and US) have registered rapid increases in volume and even more in value. But with the phase-out of the quota regime by the end of 2004, the apparel sector in the country will have to compete with countries such as China. Such considerations lead to calls for expansion of production, reduction in costs and economies of scale. The cotton industry is active and organised an All-India Cotton Conference during the RT's visit to the country. Production of cotton is organised through agriculture departments at the state level.

The total area in *G. hirsutum* is 2.7 million ha (35%), hybrid varieties also cover 2.7 million ha (35%), while *G. arboreum* covers 1.3 million ha (17%). According to a newspaper interview with the manager of a hybrid seed company, in 2004, the area sown with Bt Cotton was 500,000 ha. Since the Government was still considering its introduction in 2002, this would represent a very rapid take-up allegedly facilitated by the fact that the Bt gene has now

been spliced into local varieties. So far, the Programme has only covered *G. hirsutum* and hybrid production.

Cotton is by far the largest consumer of pesticides, with 54% of the total consumption on 5% of the cropped area. The use of pesticides measured in tech-grade tonnes has gone down in the three Programme states since 1990, but this is largely attributed to the shift from broad-spectrum to specific pesticides and low volume application techniques. Meanwhile cheap broad-spectrum biocides imported especially from China remain popular. Pesticides are a widely recognised problem. During the visit of the RT with GOI officials of the Ministry of Agriculture, the concern for the apparently frequent ‘pesticide suicides’, often caused by inescapable debts, was mentioned a number of times as a reason for taking IPM seriously.

The states are charged with agriculture. The central GOI sets out policies and funds the states to implement them. Such funding is covered by guidelines that are usually restrictive. States themselves have limited funds, although they do have their own funding sources, including direct development assistance. IPM falls under GOI’s Directorate of Plant Protection, Quarantine and Storage. India has no National IPM Programme. But it does have various research facilities dealing with ‘IPM’ in the sense of biological controls, bio-pesticides, etc.

Although IPM based on the FFS model has been introduced long ago, for example under FAO’s Programme for IPM in Rice in Asia, its uptake has been called rather erratic and un-coordinated. But the Cotton Project could fall back on trained facilitators for starting up ToFs. India is looking for new models to take farmers along in its rapid development and to reduce the gap between urban and rural development rates.

### **Project Operations and Design**

The Project is coordinated by an IPM Country Officer. The PMU is located in Hyderabad but may better have been located in Bangalore, to save travel costs, time and due to the strong interest of Karnataka in the project. It was a rather small outfit and had largely disbanded by the time the RT visited the country, due to imminent closure of the project. The RT did encounter ex-staff members who are actively continuing work in IPM FFS through other projects. Its five Expert Facilitators have had a major influence in the country. The staff member in charge of NGO relations has stimulated and supported a number of NGOs to become actively involved in establishing and maintaining FFS and alumni groups. An APO previously assigned to the project had a major impact on establishing and monitoring the health component especially with regard to women. She has also advised the Pakistan component of the project. The FAO Representative in New Delhi has taken a very active interest and has himself considerable experience with IPM FFS in Kenya.

The Project has worked closely with the State Governments, State Universities and NGOs. Time did not allow the RT to visit Maharashtra or Andhra Pradesh, but interactions with both the Commissioner and the Additional Director of Agriculture of the Commissionerate of Agriculture of Karnataka indicated cordial and collaborative relationships.

### **Status of project implementation**

By the end of 2004, a total of 687 IPM facilitators (56 women), coming from government (officers from state Agricultural Departments), NGOs, agricultural universities as well as individual entrepreneurs will have been trained in five project and 21 government-funded

season long ToF courses. In addition, the project financed three and the Government funded seven FToF courses, training 376 IPM FFS alumni (25 women) as farmer facilitators. A total of 1,456 FFS and F2FS were carried out: 114 as practice FFS, 1,134 regular FFS and 208 F2FS. Of these 358 were project funded, 1,095 were financed by the Government and three by farmers themselves. NGOs conducted 135 FFS, which were financed by the project or the Government. The FFS started in 2000, while F2FS began in 2002. The rapid increase in training capacity is shown by the number of FFS/F2FS, which increased over the course of the project from six in 2000 to 960 in 2004. The last project-funded FFS/F2FS were implemented in 2003. The total number of Farmer alumni will be 35,828 (5,854 women).

The curricula for ToF, FToF and FFS were designed in ‘curriculum development workshops’ and revised annually in facilitator ‘revision, planning & refresher workshops’. During these workshops and also through additional courses, technical and facilitation skills of the IPM Facilitators were improved. Special topics addressed were ‘pesticides and health’ and gender. Early, mid- and end of season FFS review workshops were held at state level for problem identification, experience sharing, FFS data reporting and planning of the next season.

The project has initiated a thorough monitoring and quality control system. One of the Project Expert IPM Facilitators was specially assigned to monitor and support ToF facilitators. Each State assigned one officer to support ToF coordinators and assist the Project Expert in monitoring. The project developed a model for quality assurance monitoring of FFS, F2FS and alumni groups. District officers (to monitor administrative aspects) and 3-4 ToF graduate facilitators in each state (for monitoring technical aspects) were given orientation training. Every crop season FFS monitors participated in refresher course.

For the Impact Assessment a local independent NGO (Participatory Rural Development Initiatives Society - PRDIS) was contracted. A pre-training survey was done in 2000, the post-training in 2002. The final report has been submitted and was of good quality.

In most IPM villages, Farmer Clubs or Farmer Associations have been established. The club members, all FFS/F2FS alumni, meet weekly and pay a nominal membership fee.

Special studies included a socio-economic gender analyses of cotton cultivation in Karnataka State (by the APO student attached to the project); health study through self monitoring in three FFS; a study on Bt cotton in collaboration with the University of Hannover and a study of the short-term and long-term effect of the standard application as seed treatment of the pesticide Imidacloprid (‘Goucho’ see Bangladesh report) on the ecosystem in farmers’ fields. This study was done by a local NGO.

The project produced a number of brochures, newsletters, posters, books, 3 documentaries (video) and maintains a website.

## **Project results**

As in the other countries, due to early termination, project-funded training did not meet expected targets. However, in India due to keen interest of implementing partners, if the inputs of the government and cooperating NGOs are included, the project exceeded its implementation targets, having held 26 ToF compared to a target of seven and 1,456 FFS/F2FS compared to 1,220.

NGOs have been significant partners in the implementation of the FFS approach at all level: staff has been trained in ToFs, FFS/F2FS have been financed and support is provided to farmer clubs. The project had a special officer in charge of NGO liaisons. The NGO in charge of the Impact Assessment study continued to be a strong supporter of the FFS approach and contributes to the sustainability and quality control of the FFS.

State Governments have contributed significantly to the expansion of the IPM-FFS programme. State Governments assigned 600 trained extension staff to work with IPM in 2004 and allocated funds for ToF, FFS and F2FS, as well as for support of 380 FFS alumni groups. State Governments sometimes contract NGOs or individual IPM Facilitators (IPM entrepreneurs) to run FFS or F2FS.

An interesting development is the training of free-lance IPM 'entrepreneurs': individuals who intend to supplement their income from rendering advisory services to FFS and Farmer Clubs. The State Government of Maharashtra financed the ToF training of IPM entrepreneurs and contracted them for FFS implementation.

Special attention was given to the relationship between pesticides and health. In 2002 an international consultancy took place on 'Community Health and Farmer Pesticide Toxicity Self Studies'. As a follow-up, self-monitoring took part in three FFS villages. The pesticides used on cotton belonged to WHO category I(b) (16.5%), category II (75.2%) and category III (3.3%). The reporting farmers (male and female) experienced symptoms and signs of mild pesticide poisoning in 20% of the cases, moderate in 56% and acute in 12%. The illness always occurred after having sprayed or mixed pesticide solutions. Only 2% of the events were non symptomatic. The exercise on pesticide poisoning symptoms recognition has been introduced in new FFS and other elements of the self-study are integrated in the FFS curriculum.

A socio-economic and gender analysis (SEAGA) of cotton cultivation was conducted in Karnataka state. The survey investigated the socio-economic factors that are potential obstacles to women's enrolment and participation in FFS, such as literacy level, type and size of family, gender division of labour and responsibilities, decision making power and control over resources. The analysis of the results showed that in the cotton farming system women provide 64% of work required, collaborative management of crop is common and that 50 % of female headed households and marginal (women run) households grow cotton.

Women's participation as FFS facilitators was low (8% of the total), but female participation in FFS/F2FS increased over 2000-2004 from 7 to 20%. NGO involvement increased the percentage of women trained as facilitators. To stimulate women's participation, six practice FFS and 60 regular FFS were held exclusively for women (in which husbands attend as 'observers'). Exercises on pesticide poisoning and adverse effect of pesticides on environment helped to increase the participation of women in FFS and F2FS. Even though the percentage of female participants was low, the impact on those participating was impressive in terms of knowledge, self-confidence, social skills and entrepreneurial initiatives.

The pre- and post-FFS impact assessment study gave clear indication of positive impact of the programme, showing economic benefits to farmers, reduction in pesticide usage, positive environmental and health impact and increased social benefits. The findings showed that compared to non-FFS farmers, FFS graduates:

- Gained more knowledge, skills and confidence with respect to pest management and crop production practices, and knew more about the adverse effects of pesticides;
- Developed better skills in conducting simple field trials to evaluate new practices/technologies before adopting them;
- Showed positive attitude changes concerning social norms such as women in agriculture;
- Were able to reduce their cost of cultivation by \$177/ha more than the non-IPM farmers;
- In terms gross margin, gained \$103/ha more than the non-IPM farmers.

Evaluation of the 2003 FFS revealed that in all three Programme States, the FFS showed a higher net profit in the IPM plots compared to the farmer-practice plots. There was also drastic reduction of insecticide usage in IPM plots. In many FFS no insecticide was applied in the IPM plot, and yet there was no reduction in yield compared to farmer-practice plots

Realizing that institutionalisation of IPM at the farmers level is essential to ensure sustainability, the project has been encouraging FFS farmers to form associations and clubs. The project designed a system for alumni group follow-up by FFS facilitators/monitors to facilitate the farmer groups to continue IPM activities. In 2003, the project successfully used this system to support 86 active alumni FFS groups. The State Governments have adopted this system and in 2004, they have committed to support 379 alumni groups. Some of the groups are exclusively male or female; others are mixed. Based on a visit of 4 clubs the observed achievement were: development of 'scientific' attitude; understanding of crop economics; ability to solve local problems; increased self-confidence; income generation (sales of vermi-compost and vermin-cultures, Trichogramma cards and neem-based pesticides); reduction in pesticide use. Future plans as expressed by participants were: every household to produce compost; organic village (were already in contact with interested trader); study tours; village ginnery; purchase of multipurpose thresher.

One of the spin-offs of the IPM-FFS programme is the production of organic cotton by some Farmer Clubs. A local NGO (ETC), in collaboration with an NGO of the Netherlands (SOLIDARIDAD), is following the FFS approach in organic cotton production in the States of Andhra Pradesh and Maharashtra. The ETC has absorbed 5 project-trained facilitators into their project on organic cotton to conduct FFS. SOLIDARIDAD facilitates the marketing in Europe and the certification requirements.

The positive experiences with the FFS approach in cotton has resulted in the implementation of IPM-FFS in other crops as well as the model for reaching farmers in donor funded projects related to water- and watershed management. These projects make use of the IPM project trained facilitators.

### **Sustainability at the national level**

The Indian Government is highly committed to continue the IPM approach and the Farmer Field Schools. Other organisations and NGOs are picking up the FAO scheme independently or as a result of the FAO-EU activities. The RT feels quite sure about the sustainability of the project in the States where it has been operational.

Considering the poor soils of the plateau areas and the dependence of crops on irregular monsoons, switching from food crops to cotton continues to be of high risk for farmers. Under such conditions the IPM approach is reducing investments into costly pesticides and

minimizing the financial losses in years of insufficient rains. Organic cotton for Europe may bring opportunities for local farmers and promote sustainability.

The Farmer Field Schools have contributed much to overcome social problems by bringing farmers, men and women, together for a common cause.

### **Recommendations**

1. Karnataka and Maharashtra, two of the three states on which the Programme has so far focused, plan rapid scaling up of the number of farm families reached through IPM Farmer Field Schools with state funds. Maharashtra has adapted the FFS for this purpose. Both states have allocated an amount of state funds for this purpose. This amount will not increase so that the amount that was used to establish 300 FFS will be used for another 300 next year. The RT recommends that the quality of the FFS during this scaling up is carefully monitored and protected. As the experience with large-scale extension programmes has demonstrated, training a small number of farmers well is more cost-effective than a large number badly. Training large numbers requires investment in quality maintenance, follow-up and refresher training. Quality here applies both to (a) the educational and empowerment aspects, and to the technical aspects of FFS
2. IPM/FFS alumni groups have been registered as Self Help Groups to a limited extent. The RT strongly encourages such registration, even if this means expanding into subjects that cannot be brought under the umbrella of IPM. The registration as self-help group and the benefits that accrue from it, especially in the case of rural women, can be an important incentive for sustainability of the impact of IPM FFS training.
3. The RT recommends that the GOI explore the options for building greater flexibility into the guidelines that accompany federal funding of state FFS projects, allowing these projects to link with watershed management, value adding activities of local groups, refresher courses for facilitators and farmer trainers, etc. At present, the guidelines are too narrow and hamper the systemic support of field schools, alumni groups, farmer trainer associations, etc.
4. Given that India has no national IPM Programme, the RT recommends that GOI establish such a programme so as to allow channelling of existing schemes towards IPM according to the FAO model. The availability of flexible funding to the states is crucial if only because making available funds to pay facilitators' per diems, kits for FFS training, materials and other essentials has proved to be virtually impossible under the prevailing arrangements.
5. The RT recommends that FAO contact the persons responsible for preparing for EU funding of a country project in the States of Rajasthan and Chhattisgarh. This project, which shall focus on the themes of environment, education and health, could benefit greatly from the possibility of building in an IPM FFS approach that would cut across these themes. This is the only possibility the Review Team could identify for EU-funded activities in India to follow-up some of what it started with the FAO/EU IPM in Cotton Programme.

### **People encountered**

Dr Palaniswamy Pachagounder, Cotton IPM Country Officer, FAO-EU Programme for Cotton in Asia, Hyderabad

Dr Daniel Gustafson, FAO Representative in India and Bhutan, New Delhi

Mr. Ashish Bahunguna, Joint Secretary Plant Protection, DAC, GOI, New Delhi

Dr Amand Shah, Deputy Secretary, Ministry of Agriculture, Government of India, New Delhi  
Mr. J.P. Meena, Joint Secretary (Crops), DAC, GOI, New Delhi  
Dr H.C. Ganton, Crops (Cotton) Commissioner, DAC, GOI, New Delhi  
Mr. V.K. Yadava, Assistant Plant Protection Advisor, DAC, GOI, New Delhi  
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Dr A. Rajanna, Additional Director of Agriculture (Human Resource Development, Commissionerate of Agriculture, Bangalore, Karnataka  
Mr H. Narayana Reddy, Joint Director of Agriculture, Dharwad District  
Ms Naheeda Anjum, formerly expert facilitator of the FAO/EU IPM in Cotton Project based in Hyderabad, now Dharwad District Monitoring Facilitator for IPM FFS funded by the State of Karnataka.  
Mr Arun Chandra, Programme Manager and Team Leader, Solidaridad/ETC Organic Cotton Programme India, formerly expert facilitator of the FAO/EU IPM in Cotton Programme.  
Mr Gijs Spoor, Representative of Solidaridad, The Netherlands  
Mr Dilip Chinnakonda, Senior Consultant, ETC (Ecology, Technology and Culture) Consultants, India  
Prof. S. Venku Reddy, Executive Director of PRDIS (Participatory Rural Development Initiatives), Hyderabad. Impact Assessment consultant to the FAO/EU IPM in Cotton Programme.

(In the Netherlands)

Ms Francesca Mancini, APO with the FAO/EU IPM in Cotton Project  
Mr Mans Lanting, ETC, Leusden, The Netherlands

Due to some social unrest during the RT's visit to Bangalore, the RT unfortunately could not meet with the Commissioner for Agriculture of Karnataka.

## **Pakistan**

### **Acknowledgements**

The Review Team thanks Drs Iftikhar Ahmad, Director General and National IPM Coordinator, and Manzoor H. Soomro, National IPM Expert/Project Coordinator, for organizing a very informative visit in Pakistan. The effort of the staff of the National IPM Programme to brief the RT in all aspects of the Programme was greatly appreciated. We thank those persons who kindly met with us in Islamabad: Mr Syed Mohammed Ali, FAO National Programme Officer; Mr Michael Dale and his staff at the European Commission; Dr Naeem Iqbal Hasmi, of the Pakistan Agricultural Research Council, and Dr Areef Khan, Secretary of Agriculture of the Punjab Government and Prof. Dr Ikram-ul-Haq. We also thank the facilitators and FFS groups in Bahawalpur and the women in a ToF for an Integrated Fresh Water and Pest Management Project of the WWF and National IPM Project.

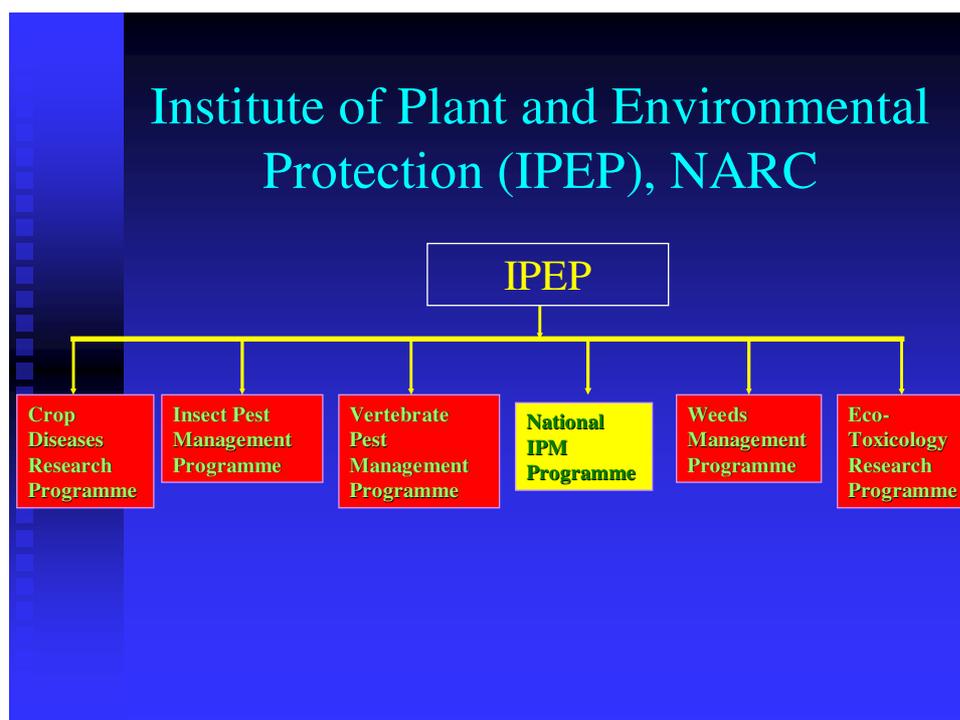
### **Relevance of the project to national priorities and needs**

Pakistan is the world's fourth largest producer of cotton and a major exporter. *Gossypium hirsutum* has been grown in Pakistan for a long time and vast areas of irrigated land are devoted to the crop, covering a total area of 3 million ha, of which 2.2 million in the Punjab (producing 8 million bales) and 0.8 million in Sindh (producing 2 million bales), with only very small acreages in other provinces. The crop fits neatly into the two-season farming system, with winter wheat following cotton in the Punjab and rice following cotton in Sindh. When cotton prices are good, farmers continue picking cotton and delay the sowing of the winter crop. It appears that only very small acreages of other crops play a role in these simple rotations. Vast acreages of mono-cropped cotton cover the land during the season. These conditions are conducive to outbreaks of whitefly, cotton leaf curl virus and especially various species of bollworm. Pesticide use has sharply increased since the sixties and the pesticide industry is deeply embedded in the institutions that support cotton production. The cheapest pesticides are broad-spectrum biocides imported from China. Even before the project, the Government had installed a Task Force to look at the over-use of pesticides in cotton which accounts for 69% of all pesticides used in Pakistan.

Given the importance of cotton in the national economy and the heavy use of pesticides on it, the Project was very relevant for Pakistan. Furthermore, the FFS approach's potential for generating benefits beyond IPM in cotton seems to have been widely recognized among senior decision makers in terms of outcomes which the old extension approaches had never been able to achieve.

### **Project operation and design**

Pakistan is the only one among the six project countries that did not have any previous experience with IPM in rice or vegetables. The set-up of the Project in Pakistan differs considerably from the other countries covered by the Programme.



As the figure shows, Pakistan has a national IPM Programme that falls under the Institute of Plant and Environmental Protection of the National Agricultural Research Centre. It is a well-conceived programme with a clear focus, objectives and goals. Its goal is a large scale and sustainable implementation of IPM in Pakistan, rational pesticide use, while maintaining production levels and increasing farmers' profits. 'Rational pesticide use' translates into a quantified goal of reducing pesticide use by 50% in the project area without compromising yields.

Under the umbrella of this National IPM Programme, Pakistan has set up a National IPM Project, organised as shown below.



This Project integrates three different donor supported projects:

1. The FAO/EU IPM in Cotton Project;
2. The ADB Technical Assistance Project;
3. The Arab Growth Fund support of risk reduction in women in Pakistan.

These three projects have been managed as one with the FAO/EU Project channelling the funds and allowing flexibility, and permitting close links between the Project Coordinator and the National IPM Coordinator. Pakistan has allocated \$ 3.3 million for a five year National IPM Project in four provinces that starts in 2004. Part of this project is the continued work of an economist, charged with monitoring the quality and impact of the activities and feeding back the information in a 'quality circle' of coordinators and facilitators (learning through monitoring). The Project has signed letters of agreement with various private partners, including NGOs, such as WWF, and Plan Pakistan and even a chemical company (for an experiment to test the effectiveness of pheromones in combating the Pink Bollworm).

Given the tremendous impact of the FAO/EU Programme in Pakistan, the RT strongly agrees with several of its interlocutors that the withdrawal of the Programme after a crucial start-up phase has negatively affected the activities in Pakistan in several ways. It is not so much a matter of funds, but of flexibility, expert support, and experimentation.

### **Status of project implementation**

By the end of 2004, a total of 425 IPM facilitators (8 women), coming from government (Field Assistants of Dept. of Agriculture, staff of Department of Agricultural Extension, staff of research institutions, including cotton), NGOs and MSc students from agricultural universities will have been trained in four project and 16 government/ADB funded season-long ToF courses. In addition the project financed two FtoFs, while two NGOs funded an additional two FToF courses, training 109 IPM FFS alumni (7 women) as farmer facilitators. A total of 510 FFS and F2FS were carried out: 150 as practice FFS, 32 as practice F2FS, 276 regular FFS and 52 F2FS. Of these, 292 were project funded and 218 were financed by the government. Fifteen were implemented through NGOs. FFS started in 2001, F2FS in 2003. The number of FFS/F2FS increased from 25 in 2001 to 270 in 2004. The last Project funded FFS/F2FS were implemented in 2003. The total number of Farmer alumni will be 13,006 (231 women) by the end of the 2004 cotton season.

In addition to the cotton IPM ToFs and FFS, special training was provided for women through an Arab Gulf Fund project. This project organised a Women Facilitators Training course (WFT) for 36 participants in 2002 and 48 Women Open Schools (WOS) in 2003, with 968 female participants.

The curricula for ToF, FToF and FFS were designed and improved in yearly 'Curriculum development & improvement workshops. Annual facilitation skills enhancement workshops (for ToF graduates of previous year in 2002-04; for WFT graduates in 2003) and a planning and refresher workshop was held to upgrade the skills of the facilitators in 2003<sup>14</sup>.

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<sup>14</sup> Planned workshop in 2004 could not be held due to lack of funds.

The project has initiated a thorough participatory monitoring system using trained District level IPM facilitators and specially developed monitoring forms. National IPM Experts supervise the reporting and visit FFS to evaluate organisational issues. CABI Bioscience was involved in quality control of ToF, FToF and FFS curricula. The Impact Assessment was supervised by the Social Science Institute of NARC. An extensive report has been submitted.

In many IPM villages Farmer Clubs or Farmer Associations have been established, of which some are formally registered as welfare organisations. In addition, some IPM facilitators, farmer facilitators and women facilitators have formed 'Facilitators Associations'. The Project assisted in the holding of three farmer's congresses in 2003 to improve the contacts and exchange ideas and experiences from different farmer groups. The IPM Programme also stimulated the establishment of an IPM Community Organisations Network. To enhance the capacities of recently established farmer organizations at district level, two workshops on 'Community & Leadership Management Skills' for Farmer Leaders were held in Punjab and Sindh,

Field studies were carried out in the ToFs, FFS and by farmer alumni groups and were related to different aspects of cotton production. ADB funded on-farm participatory research with 53 farmer groups in Sindh. In a preparatory Workshop 55 experiments were identified and farmers did additional experiments. Special studies were implemented on the effect of pesticides on human health and the soil biomass. A socio-economic study looked into the awareness of rural women about pesticide exposure and the role of women in cotton production.

The project produced a number of brochures, newsletters, posters, reports, two documentaries (video) and maintains a website.

### **Project results**

The Programme has had a tremendous impact in Pakistan. The country was ready for it and used it to the utmost. Since the Mid-Term Review in 2003, a major achievement has been to fully involve and cover the Province of Punjab, previously had not participated. The project was well supported and promoted by the former FAO Representative, as well as by prominent nationals who have taken great care to develop a network of professionals before setting up the IPM Programme.

The project met the target for ToF as set in the Project Document. The project financed 4 ToFs (vs. 2 target) and also funded 2 FToFs. It provided funds for the implementation of 292 FFS/F2FS, which did not meet the set target of 419 due to lack of funding in the last year of operations. However, if the inputs of the government/ADB and cooperating NGOs are included, the implementation has far exceeded the targets, evidence of strong Government commitment to the Programme.

Government commitment is shown in several ways. The Government has adopted FFS as preferred 'extension' approach and job descriptions have/are being revised to comply with this. The National IPM Project, launched in 2004, anticipates to train all agricultural extension/field staff in IPM and for them each to have one FFS. The FFS methodology has been extended to other areas, such as water management.

Local NGOs, such as WWF, Caritas, Plan Pakistan, NRSP & DGKRDP (Punjab) have become active partners in the implementation of the FFS. Plan Pakistan applies a ‘family’ approach, organising FFS for men, WOS for women and Ecoclubs for children in the same village.

An interesting development is the formation of Associations of IPM Facilitators and of Farmer Facilitators, officering facilitation services and farmer club support. The National Programme contracted five of these organisations to implement 80 FFS/F2FS in 2004. Funds were provided through the ADB Project, backstopping came from the Project. Unfortunately this arrangement will not be extended if donor funds are not available, since government funds can only be used to engage government-employed facilitators.

In the project special attention was given to pesticides, health and women. Two project-funded studies showed a noticeable adverse effect on the health of exposed persons due to pesticide exposure. A third study involved a socio-economic survey and showed that women had little awareness of pesticide poisoning and that their role in cotton production was mainly picking. The study results were included in the baseline survey report.

Women participation in the activities was low (2% of the IPM Facilitators, 6% of the Farmer Facilitators); participation in FFS/F2FS was less than 2% and did not increase over the 3 years. NGO trained more women as facilitators (38%) and had higher participation of women in FFS/F2FS (30%).

To stimulate women’s participation, the AGFUND financed special project on “Pesticide Risk Reduction for Women in Pakistan” was entirely focussed on training of female facilitators to reach rural women. Emphasis was on the toxicity and health risks of pesticides, but also other elements in the cotton-based farming systems were included. Participation of women in mixed FFS groups was considered culturally not acceptable (this was confirmed by WOS alumni participating in FToF) but participation of women in mixed FToF seemed to be possible, as is the acceptance of female facilitator in male FFS.

The Impact Assessment was well-done and extensive.

### **Sustainability at the national level**

The project was very successful in Pakistan, having built a large cadre of facilitators and strong support at the policy level. There is also a determination to continue, to the extent possible. The project has started a major initiative to initiate IPM in schools, colleges and universities. A proposal has been launched with the Higher Education Commission to start up an Intern Programme that would involve students in the actual FFS during one semester. The Project will support women facilitators who have organised themselves to continue with Women Open Schools. The Project plans a rapid scaling up of FFS by training a critical mass of extension agents through ToFs. All this has been set up after it became known that the FAO/EU Programme would be terminated.

Nonetheless, the termination of the project will have a negative impact on sustainability, because agreements were made on the basis of verbal assurances from the EU of continued support. The gains made under the project may be fragile, since extension services also sell pesticides to farmers.

Therefore the individual farmer’s decision is key to curb the pesticides consumption. Individual farmers however will stand much stronger if they are backed by a support system.

Farmer groups will be of critical importance in providing this backing, and their formation therefore needs to be strongly encouraged.

### **Recommendations**

1. The rapid scaling up of IPM FFS foreseen in Pakistan (from 13,000 farmers reached so far to cover some 5 million farm families) demands exceptional attention to quality maintenance. The RT is aware of the monitoring system set up in Pakistan, the efforts to set up farmer organisations, refresher courses, etc. However, it recommends that particular attention be paid to maintaining facilitation skills.
2. The rapid scaling up of FFS foreseen in the National IPM Project runs risks in terms of releasing funds, supplies for FFS etc. in time for the activities to fit with agricultural seasonality. The RT strongly recommends the donor community, and especially the EU through the NIP, to make available resources to ensure flexibility in funding.

### **People met**

Dr Iftikhar Ahmad, Deputy Director General and National IPM Coordinator, Institute of Plant and Environmental Protection, National Agricultural Research Centre, Islamabad.

Dr Manzoor H. Soomro, National IPM Expert/Project Coordinator, National IPM Programme, National Agricultural Research Centre, Islamabad.

Mr Salman Khan, Security Operations Officer, UN Security, UN System Pakistan, Islamabad.

Mr Syed Mohammad Ali, Assistant Representative, FAO, Islamabad (Dr Ronny Adhikarya, the Res. Rep. was not in the country at the time of the visit of the RT)

Mr Michael Dale, Counsellor and Head of Operations, Delegation of the European Commission to Pakistan, Islamabad.

Mr Imram Ashraf, Project Officer, Delegation of the European Commission to Pakistan, Islamabad.

Dr Naeem Iqbal Hasmi, Member Crop Sciences, Pakistan Agricultural Research Council, Islamabad

Dr M. Ashraf Poswal, Centre Director, CAB International, Regional Bioscience Centre Pakistan, Rawalpindi.

Mr Mohammed Azeem Khan, Economist/Impact Assessor, National IPM Programme, National Ag. Research Centre, Islamabad.

Mr Roshan Zada, Expert Facilitator, National IPM Programme, National Ag. Research Centre, Islamabad.

Mr Anjum Munir, Expert Facilitator, National IPM Programme, National Ag. Research Centre, Islamabad.

Ms Shagufta Aziz Khan, Expert Facilitator Women Open Schools, National IPM Programme, National Ag. Research Centre, Islamabad.

Mr Munawar Raza Kazmi, Expert Facilitator, National IPM Programme, National Ag. Research Centre, Islamabad.

Mr Iftikhar Hussain, Expert Facilitator, National IPM Programme, National Ag. Research Centre, Islamabad.

Mr Arif Nadeem, Secretary, Department of Agriculture, Government of Punjab, Lahore

Ms Arifa, Overall Project Director, Department of Agriculture, Government of Punjab, Lahore.

Prof. Dr Ikram-ul-Haq, Biotechnology Research Centre, Department of Botany, Government College University, Lahore.

Farmers and facilitators in Bahawalpur, Punjab, including Muhammad Ahsan Fareed, Farmer Facilitator of the Kissan Welfare Association, created by IPM Facilitators under the National IPM Programme.

## **Philippines**

### **Acknowledgements**

The mission would like to thank the IPM Cotton project staff for arranging the field visit and meetings with officials. In particular we would like to thank the Mayor of Bayawan City, Mr German P. Saraña, Jr., for giving us insights into the future support to be provided by the LGU and Mr Louis Sese, Deputy Administrator, CODA and Ms. Jeanette M. Villareal, IPM Coordinator for accompanying the mission during the field trip. We are also grateful to Mr Jesse Binamira, Director of the National IPM Programme and Mr Eugenio Orpia, Jr., Administrator, CODA for their assistance.

### **Relevance of the Project to national priorities and need**

The Philippines has a long history of IPM, primarily for rice and corn cultivation. The country has a vigorous national IPM policy, supported by a programme called KASAKALIKASAN that focuses on farmer's participation and education through farmer research, known as Participatory Technology Development (PTD). Agricultural extension and training is the responsibility of the Local Government Units (LGU). The Cotton Development Authority (CODA) provides extension for cotton growers and some ginning services. Because of the decline in the area planted under cotton, in the near future CODA is to become part of the Fibre Industry Development Authority (FIDA) under the Department of Agriculture.

The main issue regarding relevance of the project in the Philippines is the drastic reduction of area under cotton from about 35,000 ha in 1992 when the project was originally planned to less than 2000 ha in 2003. During the mid nineties, the drop in area under cotton was largely due to an increase in pest infestation, with farmers having to increasingly rely on insecticides – representing a high percentage of the total cost of production. In later years, the underlying economics of the commodity and drop in world prices for cotton compelled farmers to switch to other crops, especially sugarcane. In the last few years, insurgency and social unrest in the main cotton producing area, Mindanao, further reduced the area under cotton production.

In areas where cotton represents a viable alternative, the LGU are interested in promoting cotton cultivation to reduce farmer's dependence on sugarcane which has become less viable due to declines in quality and price. Cotton cultivation with IPM is therefore being considered as a viable second crop after rice to address both environmental concerns and dependence on sugarcane. Reduced use of insecticides should contribute to more profitable cotton production, which could make cotton production sustainable in the country.

### **Project operation and design**

At the time of project design, the relatively negligible area under cotton in comparison to other project countries brought about considerable debate on the wisdom of including Philippines in the project and three options were considered. The first was to drop the country from the regional programme altogether, the second to include the Philippines as an advisor and observer country due to its long experience with IPM and the third to continue with the project but in a limited way. A FAO mission fielded in 2000 recommended the third option be considered and this was agreed by the EU. The Philippines programme therefore started later than the other countries.

## **Status of Project implementation**

Project activities began with a workshop in October 2001 to design a curriculum for a refresher course for trainers that would be involved with the project. Another workshop was held in February 2002 to finalize the field exercises and studies that farmers might undertake. In June 2002, a technical meeting and workshop was held to assess the experience of the first year, which recommended intensifying facilitation skills in future training. Because of the very low number of farmers in Luzon, the mid term review recommended that the Philippines component shift its focus of operation to the more important cotton growing areas in the south, particularly Mindanao. This was accepted and a season-long Training of Specialists was conducted in Bayawan City, Negros Oriental from 13 October 2003 until 5 March 2004 bringing the total ToF conducted to 3.

Under the project, a total of 41 FFS were implemented (of which 12 were partly supported by the LGU). The available cotton facilitator cadre and training capacity at the end of the project consists of 80 facilitators trained (54 male and 26 female), 36 FFS from which 920 farmers graduated, of whom 493 are male and 427 are female.

Seven PTD studies were conducted in Luzon in the provinces of Pangasinan and Ilocos Sur with 132 farmers. A baseline study was done by Silliman University in 2003 as a start up to the impact assessment study. Due to termination of the project, this will not be completed. A regional workshop on *Enhancing Facilitation Skills of IPM Facilitators*, was conducted in Sept 2003, in Cebu City, attended by 24 cotton IPM facilitators from China, Pakistan, Bangladesh, Vietnam, India and the Philippines. Exchange visits were taken up between India and Philippines in Nov 2003 to promote the exchange of information, knowledge and experiences on facilitating quality FFS.

Intended as a tool for the cotton industry and IPM advocacy, a film documentary on cotton IPM and cotton industry is being prepared by KASAKALIKASAN. A long-term strategy paper for the country has also been produced by Dr. Eugenio D. Orpia, CODA on "The FAO-EU Cotton IPM Program in the Philippines: Reviving the Philippine Cotton Industry". The study highlighted the potential of addressing the concerns on production efficiency, profitability and sustainability attributed to indiscriminate pesticide use.

## **Project results to date**

The mission had the opportunity of interacting with farmers/facilitators from the Negros Orientale Province. The training appears to have been well conducted. Farmers were enthusiastic about the training received and all planned to grow cotton in the coming season.

A major problem encountered during the training was identifying enough cotton farmers, and in Luzon where relatively little cotton production takes place, farmers trained may represent over 40% of all cotton growers in the area. For this reason, the programme accepted the recommendation of the mid-term evaluation to shift its geographic focus to the most promising cotton growing areas.

A relatively large proportion of trainers coming from LGUs are female, while trainers from CODA are primarily male. Among the farmers trained, 46% are women, and among facilitators, 38% are women. These numbers are much higher than in other project countries and women do not have the same social disadvantages as found in other countries such as India and Pakistan.

A farmer facilitator has set up an economically viable Trichogramma laboratory using low cost technology and has been successfully running the lab with sale of eggs to farmers as a biological pest management measure.

### **Sustainability at the national level**

The mission met with the Mayor of Bayawan who was not only extremely well informed about the project but had himself been trained for cotton IPM. He assured the mission that the LGU would continue support to cotton farmers after the project ended. This support will be in the form of free seed and fertilizers for a 2 ha plot size, given to about 200 farmers. Twelve FFS would be held in the coming 2004-05 season, utilizing facilitators trained by the project last year, paid by local resources. The LGU would also assist farmers in tying up with private companies/traders/ginning units for the sale/marketing of cotton produced. There were also plans to encourage cultivation of tree cotton and extract oil from alangalang (*Imperata cylindrical*).

Cotton is financed largely by private companies who contract with farmers for their output in return for seeds and other inputs (including pesticides) provided in kind. Government credit agencies are unwilling to lend to farmers who are in debt to government financial institutions. CODA is endeavouring to gain the support of private companies for the FFS approach and IPM in general. Acceptance of the project's goals by the private companies would seem to be key for sustained implementation of project activities.

### **Persons met**

Mr. German P. Sarana, Jr, City Mayor, City of Bayawan, Negros Oriental Province  
 Mr. Louis D. Sese, Deputy Administrator, CODA  
 Mr. Wilberto Castillo, Regional IPM Coordinator  
 Mr. Cosnelio Muralla, CODA Supervisor  
 Mr. Francisco T. Drao, S.P. Member, Bayawan  
 Mr. Luis J. Sumalpong, Bayawan City, Agriculturist  
 Mr. Nove A. Herrero, Bayawan City Counselor  
 Mr. Rene G. Gaudiel, Vice Mayor, Bayawan City  
 Ms. Jeanette M. Villareal, Director National IPM Coordinator (CODA)  
 Mr. Arcadio L. Cruz, Assistant FAO Representative, Makati City  
 Dr. Jesie S. Binamira, Programme Officer, National IPM, Department of Agriculture  
 Ms. Rita, Programme Officer EU

## **Vietnam**

### **Acknowledgements**

The mission would like to thank the Vietnam Cotton Company, in particular its Director, Mr Nguyen Huu Binh and the Deputy Director, Mr Hoang Ngoc Binh, for providing the information that we requested, facilitating our visit and for their kindness and hospitality. We are also indebted to the project staff in Vietnam, Mr Cesar Galvan, IPM Training Officer and Ms Nguyen Thi Xuan Phuong, Secretary, who also acted as translator for the mission on its field visits.

### **Relevance of the project to national priorities and needs**

Vietnam has a long experience in carrying out IPM programmes, having been involved in both the previous rice and vegetable programmes. While cotton is not a major crop, increased production of cotton is a Government priority, to supply the country's thriving textile industry. Cotton production is most extensive in the central highlands and southern and central coastal regions, with some limited production of tree cotton in the mountainous areas of the north.

Cotton farmers in Vietnam are smallholders, each cultivating generally less than one hectare. In the major producing areas, cotton is a dry season crop (along with maize). Because of decreased profitability, the area under cotton has fallen from about 30,000 ha in 2002 to 19,000 ha at present, as farmers now find soybeans to be more remunerative. Plans to produce cotton as a wet season crop in the Mekong Delta have been put on hold.

The Vietnam Cotton Company (VCC) is responsible for most of the commercial cotton production in the country, although in some provinces joint stock companies have been formed, as VCC has had to raise capital. VCC provides a package of inputs to farmers on credit (seed, fertilizer, pesticides) and guarantees a floor price for the purchase of seed cotton. In recent years, the price paid to farmers has been considerably below the world price (around \$0.35/kg.). VCC provides hybrid seeds to farmers and there is considerable enthusiasm to produce Bt cotton, which is currently not allowed (except as experiments) due to Government bio-safety regulations.

Vietnam's interest to participate in the project arose from the desire of the Government to increase cotton production. IPM was already the recommended practice for cotton since a collapse of the production system in the late 1970s due to heavy pesticide use and costs. However, it was reported that many cotton farmers still carried out extensive spraying operations (perhaps 10 per year). Given the country's positive experience with previous IPM programmes, the Government wanted to reach farmers previously in IPM through this project.

### **Project operation and design**

Project administration continued to be handled throughout the implementation period by the FAO-IPM office in Hanoi, although project operations were carried out in 11 provinces of south and central Vietnam. The project was housed at VCC headquarters in Ho Chi Minh City, which provided office facilities.

The project trained facilitators from both VCC and the Plant Protection Department of the Ministry of Agriculture and Rural Development. The latter is responsible for the national IPM programme. Activities carried out included ToF, FFS, technical refresher courses, special studies and participation in regional activities of the project.

The programme in Vietnam was supported by a well-qualified international cotton IPM officer from March 2002 until the NTE date. The project was previously supported by an international officer in Hanoi. Given the lack of experience of VCC with FFS, the posting of the international officer was important for assuring the quality of training under the project.

With the arrival of the international officer, FFS training was increased from 12 to 14 weeks per season. Even this amount is less than in most other programme countries, but had to be accepted in Vietnam because of the responsibilities of VCC field agents to prepare contracts with cotton growers at the beginning of the season. In practical terms, this meant a gap between first organizational meetings of the FFS and the critical first several weeks of the crop in the field.

### **Status of project implementation**

By the end of the project, a total of 122 government facilitators from VCC and PPD (of which 15 were female) had been trained through the project, in four season-long courses and 61 farmer-facilitators were also trained. The project carried out a total of 428 FFS (including practice FFS during facilitator training). Of these, 132 were held in 2001 and 135 in 2002. The number of FFS was reduced to 87 in 2003 to allow another season of facilitator training. Only 40 FFS were held in 2004, due to expected EU funding not being made available. This meant that many of the facilitators trained by the project did not have the opportunity to conduct FFS on their own. During the life of the project, a total of 10,615 farmers graduated from FFS.

The project also carried out a number of special studies, including an impact study (sub-contracted to the Agricultural Economics Department of the University of Agriculture and Forestry, Ho Chi Minh City), one on increasing women's participation (by the Vietnam Women's Union) and on biological control-based integrated management of sucking pests (by the Plant Protection Department of the University of Agriculture and Forestry). The Vietnam component also hosted two students from Wageningen Agricultural University, who carried out field research on predatory wasps that are natural enemies of caterpillar pests in cotton.

### **Project results**

The team visiting Vietnam had an opportunity to visit two FFS groups, one of which graduated in 2000 and the other in 2003, near the coastal areas of southern Vietnam. These were interviews, rather than observations of on-going FFS sessions. Both groups reported increased profits and reduced costs as a result of IPM practice and reported that they would continue to plant cotton this year. They were well aware of natural predators for pest control and reportedly reduced average number of applications of agricultural chemicals (pesticides and fungicides) from about 10 per year to 1-2. While the group that graduated in 2000 did not report any further farmer experimentation, two of the 2003 graduates were carrying out an experiment/demonstration on their own plots, on spacing and not removing maize residues from the field. Both groups seemed to have achieved considerable benefit from the training.

Not surprisingly, given the more recent FFS, the 2003 graduates seemed more confident in their skills.

Based on field observations, project reports and discussions with project staff and counterpart institutions, the mission is satisfied that the training, both of facilitators and farmers, has been conducted well and will be of considerable benefit to farmers. However, the mid-term evaluation noted a tendency for facilitators to lecture in actual FFS sessions that it observed. This may have been due to the relative inexperience of VCC field staff in conduct of FFS.

The project impact study was not completed. As pointed out in the mid-term review, it started late and therefore only two years of data (baseline and during the year of training) could be conducted. The methodology for the study was sound, but the limited results could not be used as envisaged when the impact study was designed.

The results of the study on predatory wasps as natural enemies of caterpillar pests was reportedly useful and incorporated into field exercises for FFS. The UAF study on sucking pests was unsatisfactory and did not provide new knowledge that could be incorporated in exercises.

The Vietnam Women's Union study came up with useful information on the extent of women's participation in cotton production, but the boilerplate solutions proposed were not sufficiently operational to affect the training programme.

### **Sustainability at the national level**

IPM is well established in Vietnam and FFS are conducted well. However, there appears to be only minimal financial support from national sources, when no internationally funded project is present. The mission learned that some provincial authorities will conduct FFS this year, but was unable to quantify the level of support. VCC reported its interest in continuing FFS training, but also felt constrained by a lack of resources. It expressed willingness, though, to co-finance with other sources. Given that the cost of FFS in Vietnam has been rather low compared to other countries and the number of trained facilitators in the country, the low number of FFS funded from national sources is disappointing.

While Vietnam's official policy is to follow IPM, some of the operational aspects are questionable. For example, the credit package of VCC includes pesticides. Whether the farmer uses them or not, he/she pays for them. In practice, farmers may sell the pesticides or apply them on other crops, but this seems in contrast to sound IPM practice.

Cotton production and marketing in Vietnam is in a state of flux and the economics of cotton production, from the farmers' point of view, has deteriorated since the mid-term review in 2002. While still more profitable than maize, the considerable gap between the price to farmers and the world price may make it difficult to entice more farmers into cotton production, while a good percentage seem to have abandoned it, for the time being. Provincial Governments appear to be taking a stronger role. At this point in time, the sustainability of much of the project activity is questionable.

### **People met**

Dr. Nguyen Huu Binh, Director General, Vietnam Cotton Company

Mr. Hoang Ngoc Binh, Head of R&D, FAO- IPM Co-ordinator, Vietnam Cotton Company

Mr. Anton M. Rychener, FAO Representative, Hanoi

Mr. Ngoc Tien, Programme Assistant, FAO, Hanoi

Mr Andrew Jacobs, First Secretary, European Union, Hanoi

Mr. Hoang Thanh, Programme Officer, Rural Development and Environment, European Union, Hanoi

Mr. Cesar Galvan, IPM Country Officer, HCM City