INTEGRATED PEST MANAGEMENT FOR COTTON IN ASIA

GCP/RAS/164/EC

FAO-EU Cotton IPM Programme

MID-TERM EVALUATION

27 October – 18 November 2002
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1. EXECUTIVE SUMMARY

A Mid-Term Review of the FAO/EU Cotton IPM Programme was made from 27 October to 18 November, 2002. A six-person team visited Project Management Units (PMUs) and field operations in all six participating countries of the Programme, as well as the Programme Management Unit (PGMU) in Bangkok, and has prepared findings and recommendations for both elements.

The Review Team concludes that the Project is well on track to meeting its objectives. Most effort has been focuses so far on training of IPM Facilitators (TOF) and training of farmers through Farmer Field Schools (FFS). This has been well implemented in all countries, with strong evidence post-FFS of changed farming practices, farmer engagement and enthusiasm, and commitment of governments to supporting and co-financing training activities. There is a convincing plan to make up for delays in some areas so as to realize targets of 20 TOF and at least 3,640 FFS by the end of the Project. Plans for impact analysis are in place and commented on by the Review Team. The Review Team strongly supports new emphasis by the Programme on training of Farmer Facilitators (FTOF) and its evaluation, as a basis for potential spread and scaling up.

With this good progress to share, the Project will now want to place more emphasis in its remaining years on its other two objectives, building collaboration (ie. with NGOs, researchers, private sector) and supporting policy change, particularly with respect to national IPM initiatives and pesticide regulation. Promising initial steps have been taken for both in particular countries, and should be shared across the Programme.

The Review Team examined several specific activities. Studies undertaken by farmers and facilitators in China on IPM and transgenic (Bt) cotton by farmers have shown the critical role which IPM training plays in the success of biotechnology for development and deserves rapid and widespread reporting. The Project has made concerted and valuable effort to understand the role of women in cotton IPM, and now should act on this to increase involvement of women in training and other Project activities. Information coordination and dissemination is focusing in improvements within the Programme, and will now need to include outward communication as well. Health, specifically pesticide effects, and pesticide regulation are emerging issues deserving more attention by PMUs in future.

The Review Team paid particular attention to the challenging issue of spread and sustainability of IPM, and concluded that this requires exploration of scaling up models for farmer training, action at the national level to reduce pesticide use on cotton, and steady engagement of the research community and NGOs. The Project will now make important steps in this direction (e.g. increased FTOF) but full evaluation of this potential will not be achieved in the Project period. The Review Team recommends therefore that an identification mission be made in 2003 to explore opportunities for extending the project to more countries and, perhaps, to farming systems in which cotton, and perhaps a few other crops, are drivers of unsustainable and unhealthy pesticide dependency.

For the remainder of the Project, the Review Team has identified and endorsed a need for supplementary funding of US $2m, and has recommended that the PGMU prepare now a strategy and associated annual national workplans, under the general aim of improving the livelihoods of current smallholder cotton farmers through IPM.
2. INTRODUCTION

Work began on the formulation of an Integrated Pest Management Programme for Cotton in Asia in 1993 and was submitted to the European Union (EU) as a potential donor in 1995. After a long period of discussion and consideration, an Implementing Agreement was signed in March 1999 for a five-year project with funds totalling €12 million. The project includes six countries – Bangladesh, China, India, Pakistan, Philippines and Vietnam. China, India and Pakistan are major cotton-producing countries, while the other three countries have plans to increase cotton production to supply their textile mills. With the exception of Pakistan, all the countries have been associated with previous FAO inter-country programmes on IPM, on rice, vegetables or both.

Project implementation began with the assignment of a team leader in October 1999, based at the FAO Regional Office for Asia and the Pacific (RAP) and establishment of a Programme Management Unit (PGMU). Project activities began in 2000 in China, India and Vietnam, and in the other countries in 2001.

The Implementation Agreement for the project states that a mid-term review should be carried out in the third year of the project. Accordingly, a six-person mission was organised and implemented during October-November 2002. Team members were:

- Jeff Waage – Team Leader, IPM Specialist
- Marc Debois – Environment Specialist (EU representative)
- Lawrence Shaw – Agro-Economy Expert
- Piao Yongfan – Representative of countries participating in the Programme
- Edith van Walsum – Rural Development/WID Specialist
- Robert Moore – Evaluation Specialist (FAO Evaluation Service)

The team assembled in Bangkok for briefing on October 28\(^1\) and then split into two teams for field visits to all six project countries, beginning on October 29. Team I, consisting of Mr. Debois, Mr. Piao and Ms. van Walsum, visited Bangladesh, Pakistan and India\(^2\). Team II, consisting of Mr. Shaw and Mr. Moore, went to Vietnam, Philippines and China. Mr. Waage joined Team I on its visit to Pakistan and Team II in China. On November 13-14, the team returned to Bangkok to prepare its report. The final debriefing meeting was held on November 18. The full mission itinerary is found as Appendix 9.2.

The mission members wish to thank all the Government officials, FAO Representations and EU Delegations in the countries visited for their kind hospitality, for answering our many questions and giving us a clearer appreciation of the Programme and how it operates. The mission especially appreciated the opportunity to meet and discuss with farmers in the countries, who were willing to share the knowledge they had gained, and sometimes challenge us with their own questions. Finally, we give great thanks to Peter Ooi and all the staff of the project, who did their utmost to make us feel welcome, to facilitate our mission in all its aspects and to make themselves available to assist at any time during our programme.

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\(^1\) The Team Leader attended by video conference.

\(^2\) Mr Debois left the mission after the visits to Bangladesh and Pakistan.
3. BACKGROUND

At the initiation of the Programme 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 in the world cotton market, each representing less than one-tenth of one percent of world production. Since initiation, world cotton production has risen to 21.5 million tons of lint, in excess of world use of 20 million tons, with a concomitant decline in world cotton prices to the lowest level since the early 1990s. Declines in area planted in 2002 and 2003 are expected to bring production levels down and the expected decline in world stocks of cotton, as consumption rises to 21 million tons, is expected to lead to a recovery in world cotton prices back to levels at the initiation of the project. In the August 2003-July 2004 crop year, China is expected to produce 5.1 million tons; India, 2.6 million tons; and Pakistan, 1.9 million tons. Cotton production in Bangladesh, Philippines and Vietnam is expected to be greater, though remain insignificant in a world context 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. Insecticide costs have represented an even larger proportion of costs in peak insect outbreaks in the early 1990s in China, Philippines and Vietnam. Vietnam, having undergone a crisis in insecticide use, has now adopted an IPM programme which is said to reduce the number of sprays to 1-2 per season, from 15 or more a decade ago.

High costs of insecticides have lowered the returns to growing cotton and resulted in declines in cotton area, especially in the Yellow River area of China, in India and in the Philippines. High use of chemical insecticides has also been associated with reduced effectiveness of insecticides through the build-up of resistance, declines in populations of natural enemies in the field, degradation of the environment and serious health problems among those spraying and picking cotton.

The Programme is based on the Farmer Field School concept (FFS) for integrated pest management (IPM), already demonstrated in rice, vegetables and other crop systems in Asia. IPM involves the use of a range of pest control methods which maximizes economic benefits to the farmer while protecting health and the environment, and is founded on growing healthy crops and the self-renewing contribution of natural enemies to pest control. FFS involves facilitated season-long, experiential learning by farmers in village groups. Through FFS, farmers become IPM experts and pest management decision makers in their own crops. An FFS training programme involves first the Training of Facilitators (TOF), often from extension services, who then train farmers groups every season. Continued training of new facilitators achieves a compounding effect over several years so as to rapidly expand the number and distribution of trained farmers to a level where IPM knowledge and practice becomes the norm in the farming community.

The Programme seeks through educating farmers in IPM to find solutions to their own problems with chemical control of pests, through experimentation with IPM methods, so that returns to farmers can be increased, health risks can be reduced and their cotton production can be more sustainable. The Programme anticipates that this education will be accomplished through the creation of a cadre of cotton IPM facilitators from existing extension or field plant protection personnel. The
Programme also seeks to promote co-operation among governments, research institutions, development agencies, extension services, other non-governmental organisations to improve training and support to farmers after training. The development of national crop protection policies which are more conducive to IPM implementation by farmers is also an objective.

4. PROJECT OBJECTIVES AND DESIGN

The project Implementation Agreement, signed in 1999, had as its development objective “sustainable, profitable and environmentally sound production of cotton in the participating countries, through the development, promotion and practice of IPM by farmers and extension staff”. The development objective actually includes three distinct levels:

1. development and promotion of IPM (by the project itself and extension staff), leading to
2. practice of IPM by farmers, which is assumed to lead to
3. sustainable, profitable and environmentally sound cotton production.

This development objective does not express some of the broader objectives toward which the project addresses through the FFS mechanism. The mission suggests that a more appropriate development objective is 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”.

The project’s immediate objectives were expressed as:

1. “to develop a cadre of IPM cotton trainers from existing extension or field plant protection staff to train farmers in Farmer Field Schools”;
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 to information from within and outside of the Programme area”;
3. “national policies on plant protection in cotton re-oriented to support IPM development in the six Programme countries”.

The mission feels that these immediate objectives were sufficiently clear to guide implementation. Their achievement would put in place the conditions necessary for the proposed development objective to be achieved.

4.1 Logical Framework Matrix

The original project Implementation Agreement also included a logical framework matrix, prepared in 1995. The logical framework matrix was revised in April 2002 and again in September 2002, subsequent to a visit by an EU Project Monitor, who visited the PGMU and three project countries during an 18-day mission in June-July 2002. The revised logical framework has not yet been adopted formally.

Logical framework matrices which are planning tools, rather than political documents, should not include development goals that are very removed from the project’s immediate goals. Unless, they are very precisely characterised, goals such as
“poverty reduction” and “improved livelihoods” may not provide an objective basis for assessing projects and thus may be of limited value for assessing cause and effect linkages, a key reason to do logframes in the first place. Logical frameworks also need not include objectives which are obvious and apply to all projects, such as good programme management.

The Review Team does not regard further work on a logframe as valuable at this point. The evolution of the revised logical framework does clarify that the focus of the project is on poor farmers and improving their livelihoods, rather than improving cotton production generally, which may not necessarily benefit these farmers. This position and these beneficiaries (see 4.3 below) should be clearly identified in a revised strategy for the Programme.

4.2 Project Outputs

Project outputs were defined in the Implementation Agreement and revised in the Inception Report of June 2000. Although the Implementation Agreement itself was not formally revised, it is understood that the output targets from the Inception Report were accepted as operational. The outputs have since been modified in the light of experience. The Programme has adopted different implementation strategies in various Programme countries. For example, some countries (particularly China and Vietnam) have shown strong interest in FFS conducted by farmers, which was not included in the original project design. It has been a strength of the project that it has adopted a flexible approach in the various Programme countries. In the light of experience, it would be useful for the Programme to elaborate and justify the approaches intended to be taken in each project country in the future. Such a strategy document would be used in the preparation of a subsequent project phase.

4.3 Target Beneficiaries

Perhaps surprisingly, there is no identification of intended beneficiaries in the Implementation Agreement. As a result, there is no guidance on areas where the project should go or which farmers should be reached, aside from the fact that they should grow (or perhaps intend to grow) cotton. In practice, where there has been a choice (e.g. in Pakistan), emphasis has been given to small-scale farmers. The mission endorses this as experience with other IPM programmes shows that the “trickle down” effect from training large farmers in IPM is negligible.

4.4 Programme Management

The project established a regional Programme Management Unit (PGMU), managed by a Chief Technical Adviser (CTA), posted at RAP, Bangkok. Although not located in a Programme country, the location of the CTA and the PGMU in RAP permits administrative efficiencies, including a close and effective working relationship with the CPO. Major technical contacts are with the Global IPM Facility in Rome; contacts with technical officers at RAP are much more limited.

Project Management Units (PMUs) are established in each partner country for management of country activities, associated with one or more government offices.

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3 Such a document was prepared for Pakistan in 2000, before starting the programme there.
4 The incumbent CPO, who has long experience working with IPM, retires in January 2003.
department. In Bangladesh, China, India and Vietnam, national authorities are assisted by international FAO staff assigned to the Programme.

5. PROJECT IMPLEMENTATION AND RESULTS

5.1 Training of Facilitators (TOF)

IPM Training of Facilitators (ToF) is a field-based season-long fully residential learning experience involving up to 30 future facilitators. It has a strong emphasis on non-formal education and is conducted through a full cotton 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.

Objective 1 of the FAO-EU IPM Programme for Cotton in Asia is to develop a cadre of IPM facilitators. Thus far, 20 season-long Training of Facilitators programmes (TOF) have been conducted (against 19 planned) since 2000 till the end of 2002. Two of these were in Bangladesh, 6 in China, 5 in India, 4 in Pakistan, and 3 in Vietnam. 594 participants were graduated from the TOF, and 435 future facilitators will be trained in 16 TOFs in 2003. (Details are listed in attached table). Due to a late start of the project in Bangladesh, TOF there started only in 2001. The team in Pakistan opted to complete a pesticide policy analysis study in order to achieve better focus and quality in its TOFs. These were started in 2001.

The Programme is committed to continuing improvement of curriculum and facilitation in TOFs. Each partner country reviews TOF curriculum yearly through a workshop which precedes the TOF. For instance, field studies in the TOFs are sometimes re-designed to improve the quality of scientific results for farmers to evaluate.

The general impression gained by the review team is that facilitators who have been trained in TOF are well equipped, they have learned an alternative approach to extension and adult education, to technical aspects of cotton production, and they master the tools of Cotton Ecosystem Analysis (CESA). They appear capable of transferring this experiential learning to farmers by using the skills they have acquired during their intensive TOF.

Apart from having learned new skills, the people trained in TOFs have found a new meaning in their role of extension workers, an enhanced focus and credibility. It appears that there has been a smooth adaptation to a new style of functioning which must be very different from their earlier practice for most of the facilitators trained.

It is yet to be seen whether the change in attitudes will be sustained, but the short term effect seen on ToF participants is significant and of an important qualitative nature: knowledge, attitudes and skills have been addressed in a comprehensive and integrated manner. One facilitator remarked, "This training is different. It has changed our total understanding of agriculture". Follow-up monitoring of facilitators trained should throw light on this issue.
IPM training can lead to a conflict of interest for extension workers as they may be deriving incentives or income from the sale of pesticides. Extension workers will be more likely to succeed in IPM FFS if there is a motivation to resist these other pulls. The Programme and partner countries need to make efforts to identify and reduce these conflicts. Adequate follow-up to TOF will be important, as will support from their immediate extension environment. Some interesting and relevant follow-up initiatives have emerged: in Pakistan an association of facilitators has been formed as a forum to share experience, sustain interest, and keep up the spirit of innovation. Pakistan PMU has also developed a tool to assess the performance of facilitators. This could be developed into a tool for self-evaluation and peer review between facilitators.

The FAO Regional Programme for Cotton IPM 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. There is a sense of belonging to the larger programme, which is an important moral support to trainers; each of them has to row against the stream in their own place.

**5.1.1. Refresher TOF (RTOF)**

There is a need for high quality facilitators who can efficiently and effectively run the farmers field school. Refresher of Training of Facilitators (RTOF), which lasts two weeks, aims at enhancing skills and refreshing their knowledge of the selected graduates of the TOF. Twelve RTOFs, one for China, 4 for India, 3 for Pakistan and 2 for Vietnam, and for the Philippines, 2 have been run in 2002 with a total of 207 graduates. Twenty-two RTOFs with 1320 participants have been planned for the remaining years by member countries.

RTOFs have been found useful in refreshing and reinforcing knowledge, skills and attitudes. An important complementary support mechanism is follow-up visits by expert facilitators. This allows for on-the-job performance assessment and immediate feedback can be given.

**5.1.2 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 than others and hence an important element of scaling-up and sustainability (see Section 7). FFS alumni with potential to become farmer-facilitators participate in this course to strengthen their capabilities in organizing FFS and facilitating farmer training. Farmer-facilitators will be intensively trained in ten days. Vietnam and China started FTOF in year 2000, and have run 7 FTOF with 115 graduates up to date. In Bangladesh, one FTOF has been implemented in 2002 on an experimental basis with 12 farmers, 3 of them women. All member countries have planned FTOFs for 2003 and 2004: 88 FTOFs in total, with 1320 participants.

In view of the importance given to scaling-up of cotton IPM through farmer-to-farmer training, it will be important to carefully monitor FTOF and the effectiveness of FTOF-trained facilitators. Tools already developed for assessing TOF-trained facilitator performance will ensure a common standard of evaluation.
5.2 Training of Farmers in Farmer Field Schools (FFS)

The Farmer Field School (FFS) is a primary learning approach used in educating farmers about IPM through season-long learning experience. These 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 group analytical process, which is usually carried out with comparative drawings, 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 through scientific studies.

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. Team building and group dynamics activities build stronger farmer groups. Principles of farmer-led IPM are: a) Farmers will grow a healthy crop. b) Farmers have a better understanding of field ecology, including the role of natural enemies in the agro-ecosystem. c) Farmers will make regular and careful observations of their fields. d) Farmers will become experts.

A FFS curriculum development is 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.

The graduates of TOFs and some trained farmers (graduates of FFSs in previous years) have facilitated 1150 farmers’ field schools during 2000-2002, of which 51 for Bangladesh, 469 for China, 252 for India, 131 for Pakistan, 15 for Philippines and 232 for Vietnam. In total, more than 27,000 cotton-growing farmers have been trained through FFS. Due to the delayed start of the project and resulting lack of qualified facilitators, the number of Farmer Field Schools which have been implemented has been lower than what was planned (2,203 FFSs), specifically in year 2000. The main reason for this is that both Pakistan and Bangladesh started their ToF only in 2001. For the remaining years of the project, 3,160 FFSs have been planned, which would realise planned project outputs.

The impact of FFS is very visible. Farmers demonstrate their skills in doing CESA, they have gained confidence regarding decision making. Their awareness about the risks of pesticides use has increased, and they seem capable of making a comparative cost benefit analysis. Farmer have realised that practicing IPM in cotton has led to increased net benefits due to decreased cost of production. Their awareness of the health risks posed by pesticides has increased. Reduction or even elimination in the use of pesticides has helped in restoring the cotton ecosystem. Farmers noted "an outbreak of predators". They are also more inclined towards eco-friendly alternatives for chemical pesticides such as neem-based products, chilly-garlic sprays etc. A social impact is that the FFS has become a forum for farmer learning. At several places farmers clubs have been formed. The impact has been equally strong on male and female trainees. However, in view of the fact that women do play a substantial role in cotton production, it appears that in FFS they have been under-represented so far (average
female participation for the six participating countries is 17%. This discrepancy is being addressed by the project, primarily through special studies.

At the community level there are pull factors which can hamper sustained implementation of IPM practices. Many small and marginal farmers in South Asia are financially dependent on money lenders who often are also pesticides dealers. A change in production practices does not only require knowledge, but also a supporting environment wherein these dependencies can be reduced. So far this project has addressed primarily farmer's knowledge and skills and it has sought to build their confidence in reducing their dependence on pesticides. Building farmer organisations and strengthening linkages with NGOs and rural credit institutions dealing with poor farmers and women are other areas of attention that are important and crucial for sustained impact.

5.2.1 F2FS
Farmer-to-farmer training (F2FS) means skilled farmer-facilitators will train other farmers in a field school set-up. It allows enthusiastic FFS graduates to share their new knowledge with their neighbours, and is the major component of sustainable IPM practice. Farmer-facilitators share experiences and strengthen skills in conducting Farmer-to-Farmer Field Schools through farmer-farmer meetings.

In China and Vietnam, 32 and 31 F2FS were implemented respectively, whereas in other countries this activity is still in the take-off stage. In Vietnam especially the Cotton IPM Project benefited from earlier F2FS experience in rice IPM.

The remark made regarding the importance of monitoring effectiveness of FTOF also applies to F2FS. In Bangladesh 6 F2FS have been made on an experimental basis.

5.2.2 Follow-up Activities of Farmers

Follow-up activities for FFS graduates span a broad range of training and research activities as well as 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 confidence gained in the course of IPM group activities, to many aspects of local policy making and development.

The Review Team saw a number of impressive farmer research activities. Trained farmers of Mamadapur (Karnataka, India) evaluated stem application and water spray in reducing the thrips population. They concluded that the water spray is equally effective. Similarly, in China, trained farmers critically evaluated the impact on yield of a number of products and methods for controlling disease and increasing production. A simple but effective statistical method for comparing treatments is used in these studies. The important study on Bt cotton (see Section 5.3.1) was entirely conducted by farmers. These and other examples illustrate that farmers are able to design and carry out experiments by themselves and can explain the rationale and their learning. It remains to be seen whether these skills have been acquired by substantial numbers of farmers and whether they can lead to sustained, effective experiments on cotton and on other crops. Further reinforcement of these newly
gained skills is needed. Eventually, engagement of the research community in research with farmers is important to its sustainability, but this should be progressed after farmer research confidence has become strong. Researchers should then be, made aware of good results from farmer research, and a respectful, equitable environment created for further joint research efforts. Some existing mechanisms may be utilised, for instance, in India, the Cotton Round Table provides an opportunity for researchers, government and NGO extensionists as well as input suppliers to discuss and review progress in cotton research by farmers (through FFS) and researchers.
### Plans and Results of Field Activities in Participating Countries

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<td></td>
<td>incl. Book on cotton ecology</td>
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</tbody>
</table>

**Key**
- OP: Originally planned
- # Pers.: Number of persons who graduated
- Notes: 1. Additional support in Pakistan - via ADB IPM TA and AGF/und for Women in IPM
- 2. Programme focus on quality education - include additional activities such as workshops/seminars/courses developed to improve quality. Indicators used include age of participants, gender, skill development, environment and poverty alleviation.
- 3. Cost of ToF in China is ca. US$60,000, - other countries US$40,000 - US$50,000 each.
- 5. Effort underway to reduce cost per unit ToF and FFS without sacrificing quality
- 6. New initiatives focused on achieving Immediate Objectives 2 and 3
- 7. Addtn. efforts incl. Impact assessment and research studies by nat. & intern. institutions
5.3 Other Topics

5.3.1 Bt Cotton

The engineering of toxin genes from the bacterium, *Bacillus thuringiensis*, into cotton plants for control of cotton bollworms (*Helicoverpa, Heliothis, Pectinophora* spp.) is a major technological advance in cotton pest management. It has considerable relevance to the Programme because:

1. Bt cotton provides an alternative to the use of broad spectrum chemicals for at least some generations of bollworms, the major target of pesticides sprays on cotton in Asia and elsewhere.

2. The intense promotion of this technology by multinational corporations, by national programmes (e.g. China, India), and the high expectations generated by international scientific and development community regarding this model of “biotechnology for development”, has created an impression in some quarters that Bt cotton will solve pesticide problems on cotton, obviating a need for IPM and farmer training, much as chemical pesticides were seen as a technological alternative to cultural and other current practices for pest control in the 1950s and 1960s.

The introduction of Bt cotton into China, and now India, postdates the design of the Programme, but expectations of its impact led to development within the project of a research activity in China, and establishment of a separate, EU-funded technical project contracted to the Natural Resources Institute of the University of Greenwich in UK. Specific activities of the IPM programme to date have included:

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, undertaken by a PhD student, Diemuth Pemsl, from Hannover University.

Bt cotton has been widely implemented in China. In Shandong Province, over 90% of cotton planted is now Bt cotton, while planting in Hubei Province is now about 40% and increasing. The project has revealed a number of challenges associated with the implementation of Bt cotton, including:

1. Poor seed quality: over 50% of farmers in Study 2 are re-using seed

2. High seed costs: (Bt cotton seed prices are up to 8 times conventional seed prices), encouraging the selling of poor quality or “false” Bt cotton at lower prices.

3. Poor control of late generations of bollworms: an informal observation to be confirmed by Study 2, but consistent with studies in other parts of the world.

4. Alternative pests: many cotton pests are not controlled by Bt cotton, and farmers (particularly non-IPM farmers) continue to treat these with pesticides

5. New pests: there is growing circumstantial evidence from farmer research (Study 1) that sucking insects (jassids, whitefly) and perhaps some diseases are more severe on Bt cotton

6. Poor farmer awareness: farmers, particularly non-IPM farmers, may not be aware of the value and use of Bt cotton, particularly in an IPM context.
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. Three replications were made of each of these six treatments, at each site in 2001 and 2002. Experimental conditions varied between sites, and at the time of the Review, statistical analysis had not been completed. General trends in the data, and discussion with farmers and NATESC staff suggested that:

1. Average pesticide by non-IPM farmers use 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 to non-IPM farmers may be similar or slightly better for Bt cotton, due to a decrease in pesticide use offset by higher seed prices. This income may increase further when Bt cotton is used by IPM farmers.

It is also clear from the results that the introduction of IPM methods and Bt cotton separately to non-IPM farmers each reduce dependence on pesticides to a similar degree, but IPM is more comprehensive in its effect on all pests and its contribution to farmer skills in pest management. However, it is quite inappropriate to think of these 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 maximize 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.

There was little evidence that farmers were using other alternatives to chemical pesticides, despite the proximity in Wuhan of companies producing Bt, nuclear polyhedrosis virus and Trichogramma for bollworm control. While Bt cotton may reduce the future market for biocontrol products, that market is clearly poorly developed at present. Some researchers are investigating using biocontrol products to manage the later generations of bollworm on Bt cotton, where pesticides are often used at present.

There is an urgent need to analyse, publish and promote the findings of this farmer-led research. This will benefit all cotton-producing countries in the region and contribute to a greater understanding at the international level of the importance of IPM and farmer empowerment to the successful use of biotechnology in development. Further, raising the profile and credibility of farmers as researchers in these studies will help to encourage future, positive collaboration between farmers, the project and the research community. Continuing work on the economics of Bt cotton and IPM will be valuable in China and India. No other country is likely to implement Bt cotton widely during the course of this project, although field trials will probably be underway in India and Pakistan.
5.3.2 Impact Evaluation

Impact evaluation of IPM is important to generating the high quality baseline and follow-up data necessary to understanding the success of the Programme in achieving its objectives. The fact that the project has designed an impact evaluation component is a major strength. Thus far, work has concentrated on methodological development and training, while the actual country impact evaluation work is at an early stage. Baseline data were collected in China and India in 2000, and in Bangladesh, Pakistan and Vietnam this year. No work has yet been conducted in the Philippines.

The impact evaluation work is being carried out by local institutions independent from the national institution implementing the Programme, with the exception of China where NATESC is also doing the impact evaluation. Because of the limited experience of national institutions with this kind of work, the assistance of the project Cotton IPM Impact Analysis Specialist has been most useful. However, there have been problems in data collection and the experience of contracted organisations in some countries and it has not proved possible to apply the designed methodology strictly. This being said, the actual sampling procedure does not appear to have impaired the impact assessment thus far. The programme staff is aware of these problems and of the need to verify in the baseline studies that there are no significant differences in the groups (proposed FFS farmers, non-FFS farmers in FFS areas, control group) in the pre-project situation.

The baseline for impact assessment will be done by recall survey. Questionnaires are understood to be broadly similar from country to country. Survey questions go into sufficient detail with respect to household information and considerable detail on questions relating to use of pesticides. To the extent that farmers can accurately recall information (particularly relating to costs and application rates), the surveys could produce interesting information, but a recall survey is not an effective tool for gauging social cohesion, problem-solving capacities and gender issues. Therefore, the Review Team was encouraged to learn that subsequent impact evaluation will be done by season-long data collection based on interviews. The project should consider the design of such studies so as to most accurately measure social achievements arising from FFS.

Another issue with respect to impact evaluation is cost/benefit. While it is important that the project quantify achievements (especially with respect to reduced pesticide use), it would be surprising if surveys did not find greater reduction in pesticide use among FFS farmers than the control group, more field visiting, more knowledge about harmful effects of pesticides, etc. However, FFS have a high direct cost. There is considerable debate about calculation of both the costs and benefits of FFS training. Nonetheless, information of this type is needed by decision-makers in deciding on extension methods. It may be too late for a comprehensive economic analysis of the costs and benefits of FFS in this project, but attention should be given to this area in designing a further phase and any preparatory process for that.

Cost/benefit calculations have also been made in FFS and in follow-up activities. While the calculations are likely sufficient to allow farmers to make conclusions for their own production practice, they are not sufficiently rigorous to make broader conclusions applicable to the cotton sector as a whole. Appendix 9.5 discusses these problems.
5.3.3 Role of Women in Cotton Production

In all the Programme countries, women are involved in cotton production. They are involved in sowing, weeding, harvesting and fertiliser application. They carry the water required for pesticide sprays. Women also get actively involved in pest management related operations such as handpicking of insects. In Bangladesh this work is done by hired female labour, while women in Karnataka (members of small and medium farm households) explained that they have taken up responsibility for monitoring insects since they have been trained in the FFS.

Further, women contribute not only as workers, but as decision makers as well. There are variations between countries, within countries and also between different socio-economic categories within communities. But the fact is that there is no situation where women have no role to play.

The limited number of women involved in IPM FFS reflects two things. It should be seen in connection with a male dominated agricultural extension system. Male extension workers tend to communicate more easily with male farmers. In the selection process of farmers eligible for FFS there is likely to be an explicit or implicit bias towards male farmers. In some countries (Pakistan, Bangladesh) the lower extent of women’s involvement reflects cultural realities at the village level: women are less involved in farm work and decision making and culture does not allow them to move freely. In addition, it is more difficult for women than it is for men to make themselves available for a season-long training throughout the season as there may be a clash with other responsibilities.

Once involved in FFS or TOF, women participate on a par with men. There is even a tendency for a more intensive involvement of women (in terms of number of FFS sessions attended per season). Women have proven to be excellent observers with a fine eye for detail, which makes them active and articulate participants in FFS. Women trained in FFS have become IPM advocates at home and in their villages. Women facilitators also tend to do well; it is assumed that they are (will be) instrumental in involving more women at the target group level. The experience from FFS has been that women, by getting involved in FFS, gain confidence, strengthen their status and their contribution to family decision making increases. "Why would our husbands not listen if we have something sensible to tell them?". A similar statement was made by young unmarried girls in Bangladesh and India who had participated in FFS.

In Pakistan a study was carried out on the effect of pesticides on women cotton pickers’ health. This study, apart from being part of the documentary evidence used to influence policy, laid the basis for an experiment to address pesticide and health issues with women, through "Women's Open Schools". Results so far are encouraging but yet very fragile. A beginning has been made to reach out to women but a lot of further efforts will be required to take women’s concerns further in the Pakistan context. What the experiment so far clearly illustrates is that even though women may need to be approached separately in the Pakistan context, efforts to address women must be coupled with cotton FFS. It may be well possible to evolve the women open school into a more full-fledged women FFS that runs parallel with men’s FFS but has its own women-focussed curriculum that includes pesticide and health issues as well as other aspects of cotton production. Timing and venue have to be decided in accordance with womens’ needs and circumstances.

In India, a study has been initiated which aims to arrive at a more detailed understanding of women’s role in cotton / IPM related decision making. The study is
relevant and timely. It is expected that other country programmes will benefit from this study as well - both content wise and methodological lessons can be learned. Also in India, a few all women FFS are being conducted on an experimental basis. A comparative assessment of single gender and mixed FFS would throw light on the pros and cons of various strategies. Interestingly 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.

The Programme has placed emphasis on the need to improve the role of women in IPM. Special efforts made by the Programme in Pakistan and India show that with some special adjustment, it is not difficult to increase women’s participation. Activities are also planned in Vietnam and Bangladesh. In Pakistan, there has been additional funding from AGFUND for this purpose.

Considering the above, it would be logical to have a sizeable participation of women in FFS that would reflect their actual role in production. So far, women have constituted on average about 23% of facilitators and 17% of farmers in programme training. There is scope therefore to increase women’s participation in FFS to at least 40%. This would, most probably, contribute to enhanced over-all effectiveness of FFS training, increased spread of IPM knowledge, and strengthening of women’s position both at household level and in their communities.

The Programme’s commitment to the role of women still needs to be translated into a systematic operational strategy. There is a need not just to encourage women to get involved in FFS and TOFs, but also to rethink the underlying strategies and contents and their relevance to women. Small but important adjustments will be required (e.g. in timing, FFS curriculum) to suit the needs and possibilities of women. There is a strong indication that a balanced involvement of women in the decision making process will enhance the quality of farm household decision making and improve self-esteem of women and respect for women. Women are also bringing in other considerations: intercropping (food security), health concerns, and these will strengthen the cause for IPM. It would be worthwhile to further test these predictions through case studies focussing on gender/women.

**Categories of women; their actual and potential involvement in Cotton FFS**

<table>
<thead>
<tr>
<th>Category of women</th>
<th>Involvement in cotton production</th>
<th>Decision making</th>
<th>Potential involvement in/ relation to cotton IPM programme</th>
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</thead>
<tbody>
<tr>
<td>Female managed farm household (&gt; 10% of village population)</td>
<td>She does the work, with or without help of family /hired labour, risk category for pesticide poisoning</td>
<td>She takes the decisions (may consult husband or others)</td>
<td>Should be encouraged to participate in FFS (mixed FFS with men)</td>
</tr>
<tr>
<td>Women in marginal/small farm households</td>
<td>Involved in work(^5) (sowing/weeding/ harvesting) , risk category for pesticide poisoning</td>
<td>Involved to various degrees</td>
<td>Adjust FFS functionally to their involvement and needs</td>
</tr>
<tr>
<td>Women in medium/large farm households</td>
<td>Less involvement in physical farm work. May be involved in management of farm labour</td>
<td>Though less involved in work, may be involved in management decisions</td>
<td>- do -</td>
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</tbody>
</table>

\(^5\) Varies between regions and countries.
<table>
<thead>
<tr>
<th>Unmarried girls belonging to farm households</th>
<th>Some involvement</th>
<th>Potential role: school-going girls have some authority</th>
<th>Have potentially a role in decision making; a 'potential' target group category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female labourers</td>
<td>Hired for all ‘female’ farm operations, risk category for pesticide poisoning</td>
<td>No power</td>
<td>Target group for women’s opens schools (health focus) but have little say</td>
</tr>
<tr>
<td>Girl child labourers</td>
<td>Hired for pollination of hybrid cotton, risk category for pesticide poisoning</td>
<td>Vulnerable, powerless category</td>
<td>Need awareness on pesticide issues but have no say. Their parents need to be educated. Land owners need to be sensitized/ pressurised.</td>
</tr>
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</table>

5.3.4 Improved Access to IPM Information and Information Sharing

The Programme initiated a website this year. It was followed by circulation of a Cotton IPM Newsletter to all PMU in member countries and EU delegations.

So far, eight regional workshops have been organised for sharing and exchanging the information and experiences in the project implementation:

- **Cotton IPM Planning and Curriculum Workshop**
  (Bangkok, 28 Feb - 2 Mar 2000)
  The workshop was attended by representatives from the member countries, FAO and EU. The participants planned for IPM training and associated Programme activities, reviewed available IPM Cotton training curricula and identified areas where strengthening is needed, and designed main strategic, methodological and operational elements of training according to ToF/FFS model. Panel discussions and presentations were held on the use of genetically modified cotton in IPM, pesticide policies, and control of cotton bollworm in small producer systems.

- **Regional Workshop on Helping Farmers to Understand Microbial Organisms Used to Manage Pests** (Chainat, Thailand, 11 - 17 February 2001)
  The workshop was organised by members of the Thailand Department of Agriculture Extension, the FAO Community IPM Programme for Asia, the FAO Inter-country Programme for Vegetable IPM and the FAO-EU IPM Programme for Cotton in Asia, and was held at the Regional Center of the Institute of Biological Agriculture and Farmer Field Schools of the Department of Agricultural Extension in Chainat. Twenty-two participants from seven countries and seven resource persons from five countries took part in the six-day workshop.

- **Regional Workshop on IPM Impact Assessment Methods** (Ho Chi Minh City, Vietnam, 25 - 31 March 2001)
  The workshop was hosted by the Vietnam Cotton Company with support from the Plant Protection Department of the Ministry of Agriculture and Rural Development. Twenty-two participants from five member countries and three resource persons took part in the seven-day workshop.

- **Meeting on Bt Cotton Study in China** (Bangkok, 4 - 5 May 2001)
  The international meeting was organised to discuss the planned Bt Cotton study for the year 2001. With an estimated 1 million ha of Bt Cotton grown in China in 2000, it was felt that an IPM programme should encourage farmers to evaluate the performance of local varieties and Bt cotton within the framework of IPM and non-IPM conditions. The FAO-EU IPM Programme for Cotton in Asia supports
such an approach as this develops a process of farmers generating and analysing field data, thereby encouraging them to make better-informed decisions.

- **Regional Meeting on Planning and Evaluation**
  (Ho Chi Minh City, Vietnam, 10 - 15 September 2001)
  Country strategies and work plans were presented and discussed during the meeting, which was attended by 12 participants from member countries, project staff from Bangkok and the country offices, and resource persons from Rome and Bangkok.

**FAO-EU Cotton IPM Staff Meeting**
(Rayong, Thailand, 17 - 21 December 2001)
Staff members from Bangladesh, India, Pakistan, Vietnam and Bangkok discussed ways to streamline office management and upgrade services from the Programme Management Unit in Bangkok to the Project Management Units in each participating country. Recommendations for reporting, impact assessment indicators, registration of digital pictures and plans for 2002 were made.

- **Regional Workshop on FFS/ToF Curriculum Evaluation to Strengthen Farmer Education**
  (Dhaka, Bangladesh, 11 - 20 March 2002)
  The workshop participants formulated the learning objectives for both FFS and ToF training, reviewed and modified their country curricula, and established quality indicators. During a pre-workshop session, the participants received training on how to conduct health training and monitoring of pesticide poisoning.

- **Programme Steering Committee (PSC) Meeting**
  (Chizhou City, Anhui Province, China)
  “The Programme will establish a Programme Steering Committee (PSC) consisting of representatives from EC Headquarters, FAO and the participating countries. The PSC will be a consultative body which will meet periodically (at least once a year) to provide advice on the Programme implementation and planning”. In accordance with the above statement, a PSC meeting was organised in Chichi City, Anhui Province in the People’s Republic of China from September 8th to 15th, 2002. This meeting highlights the main activities and results during the meeting culminating in a resolution that was discussed and adopted by consensus by the participants.

The Programme has also produced a number of documents on proceedings (5) of the regional workshops/meetings and progress reports (4).

Information sharing at the national level has a number of forms. The Indian PMU, for instance, has taken a number of steps to create awareness among policy makers in Central and State Governments, officials of the agriculture/plant protection/extension departments, research institutes, universities, political leaders, farmers and NGOs through conducting field days (demonstrating achievements), farmers congress/mela, etc. In all countries, intra- and inter-province (or state) visits by facilitators have been organised to update and share IPM information and experiences among national staff. There have also been international exchanges of facilitators between project partner countries.

The PGMU is giving priority to the collection and organisation of Programme data and its distribution within the Programme. Annual meetings of international and national Programme staff are intended to maintain consistency, quality and focus across the Programme, as are meetings of the Project Steering Committee. These are all important activities and should be continued. The website is a rapid way to
realise both internal and external information distribution and should be moved forward quickly.

The Programme may consider bringing out national editions of the IPM Newsletter in each country. This would be useful in informing policymakers as well as in communication with other institutional stakeholders. Short videos documenting specific aspects of the IPM / FFS approach and its results would also be very useful communication tools.

The Review Team found that national projects were often working in new areas for them where greater access to information and contacts would be valuable, e.g. on economic evaluation, health issues, pesticide policy, and new technologies. In some cases, that expertise was probably quite local, and PMUs should be encouraged to foster these links. In other cases, there may be a growing role for the PGMU as a demand-driven service for national project access to information and expertise.

The project to develop a report on the state of IPM has not made much progress and should be reviewed. The value of a general, global assessment to the Programme may be limited, except perhaps in the context of the potential impact of global changes in the cotton economy on partner countries and hence on their IPM programmes. It would be better for the provision of information on cotton IPM outside the region to be demand-led from national partners, as described above.

The remainder of the project would benefit from a clear strategy for dissemination of its outputs outside the Programme countries, now that publishable Programme results are emerging. Emphasis might be placed on reaching other cotton growing countries in the region, and then on contributing internationally, particularly through publications in areas of strong national/donor interest such as pesticide reduction, the economics of farmer-led IPM and biotechnology for development.

### 5.3.5 Health

Health has obviously been a key concern in the Cotton IPM Programme. Cotton is the crop attracting most intensive use of pesticides, which has obvious health risk implications. Two categories are primarily at risk:

1. Men who spray the pesticides, and
2. Women who get extensively exposed to pesticides, especially during picking.

In addition, there are the risks associated with storage of pesticides in the house. And there are other specific categories at risk in specific instances, such as the large number of young girls in Andhra Pradesh (India) involved in pollinating hybrid seed cotton.

The project has strengthened relevant activities on the health issues in the ToF and FFS as follows:

1. Involved an international consultant for training facilitators on pesticide poisoning symptoms.
2. New exercises of self-monitoring of pesticide poisoning as a part of post-FFS activity are developed and included in the ToF and FFS to create awareness and interest among participants; Special study undertaken in Pakistan to assess the impact of pesticide on cholinesterase levels in the blood of women
pickers.

3. Women’s Open School in Pakistan with the prime objective to raise women's awareness on health risks posed by pesticides.

4. Plans for conducting health studies in Bangladesh and India.

5. Plans to conduct student field schools in rural areas in Pakistan, where children working in seed cotton production are exposed to pesticide poisoning.

Although the Programme has given emphasis on health issues and the very real dangers of pesticide poisoning, the Review Team observed that, with a few exceptions, this is still an area that deserves more attention in national projects. Pesticide-related health issues are not gender-neutral: women labourers and young (girl) children are important risk categories and this is often under-reported.

In the remaining part of this project, further work should be done to highlight and understand these issues in Programme countries. Studies and methods under development in Pakistan and planned in Bangladesh, along with information from other Programme countries and international sources, could be the basis for similar work in other countries (e.g. India) and an effort to share and discuss this work would be desirable.

The safe use of pesticides as a component of farmer training is a controversial subject which has been discussed by the Review Team, as it has in many other forums. The approach followed by the Programme is to create awareness about symptoms of pesticide poisoning and to encourage those directly in contact with pesticides to think about how they can minimize contact. This is done within the context of FFS, where the participants learn ways of avoiding pesticide use, and the Review Team concludes that this approach is appropriate.

### 5.3.6 Project Management

A central Programme Management Unit (PMGU) is established at the FAO Regional Office for Asia and the Pacific in Bangkok. It is staffed by the CTA, an Environment and Impact Analysis Specialist and an IPM Liaison Officer at the professional level, and a Secretary, Administrative Assistant/Accounting Clerk and Driver/Messenger as general service staff. The unit provides central direction to the Programme and supports Project Management Units in each of the six countries. Project staffs are very dedicated and hard-working. Project reporting has been very complete. On numerous occasions, the technical support given by the PMGU was cited in countries as being valuable.

Project Management Units (PMU) are established in each project country except the Philippines. Professional IPM Country Officers are assigned to the project in Hyderabad, Beijing, Dhaka and Ho Chi Minh City and Assistant Professional Officers (APO) are assigned in India and Vietnam. Four National IPM Experts are assigned to India and one each to China and Pakistan (there is an additional National Resource Person in Pakistan), while a Technical Assistant works on the project in Ho Chi Minh City. Besides the PMGU, ten additional general service staff are paid directly by the Programme in all countries except China.
6. BUDGET AND EXPENDITURE

The initial budget for the Programme was provided in the Implementing Agreement between the EU and FAO, which was signed in February and March 1999. It was assumed in the Implementing Agreement that Programme activities would begin in 1999 and end on December 31, 2003.

As no funds for the Programme could flow until a Chief Technical Advisor was hired in mid-October 1999, it was realised that the budget for the project contained in the Implementing Agreement was not realistic as a working document. As a result, a “Budget Revision B” was initiated at the end of April 2000, which recognised that project activities would basically occur in the five years 2000-2004. It might be noted that, while the revised budget was taken as a working document by the Programme, it did not actually return from FAO Rome to FAORAP until January 2002. The revised budget assumed that Programme activities would begin on October 17, 1999, and end on October 16, 2004. A further budget revision, “Budget Revision C,” was also made. Comparisons between the initial budget and actual expenditures refer to the budget revision initiated in April 2000. It is also noted that the calendar period was December to November in the 1999-2001 period and January to December beginning in 2002. The year 2002 includes 13 months to make the transition.

Budgeted totals by year for the project, as specified in the Implementing Agreement and the revised budget are as follows (in $US dollars):

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<tr>
<th>Year</th>
<th>Implementing Agreement Budget</th>
<th>Revised Budget April 2000</th>
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<td>2003</td>
<td>2,237,686</td>
<td>2,695,637</td>
</tr>
<tr>
<td>2004</td>
<td>0</td>
<td>1,314,402</td>
</tr>
<tr>
<td>Total</td>
<td>12,622,541</td>
<td>12,622,541</td>
</tr>
</tbody>
</table>

Actual expenditures charged to the project in 1999 were only $2,490, as recognised in the revised budget.

The Programme had a somewhat slow start in 2000. While 6 Training of Facilitator courses were planned for 2000 in the revised budget, only 4 were accomplished. While 181 Farmer Field Schools were planned in the revised budget, only 63 were held. As a result, actual expenditures in 2000 were $937,844. Total underspending to date at the end of 2000 was $1,669,904.

Programme activities were in full swing in 2001 with 8 TOFs conducted. A 30 day refresher-like TOF was begun in the Philippines in November. Thus, 9 TOFs were underway in 2001, as opposed to the plan of 8, resulting in a cumulative shortfall of one TOF. The number of FFSs held in 2001 continued to fall short of the plan. While 711 FFSs had been planned, only 280 had been held by the end of 2001. Actual expenditures in 2001, while more than double those in 2000, at $2,292,638, were still short of the plan in the revised budget by $682,934, leading to a cumulative shortfall in spending of $2,352,838.
In 2002, the Programme began operating with a full staff of 7 internationally recruited professionals, as opposed to the 4 international staff foreseen in the planned budget of the Implementing Agreement and revised budget. In addition to the team leader, an impact specialist and project officers in China and India, project officers were hired for Vietnam (where the location of project activities in HCMC, as opposed to the FAO office in Hanoi, necessitated the position for operational reasons) and Bangladesh (where control of the project in this country necessitated having an international position) and an additional staff position was added to the team in Bangkok, to handled the increasing burden of negotiating Letters of Agreement, which became the funding mechanism for China. Anticipated expenditures in 2002, with 8 TOFs held as opposed to a planned 5, an increasing number of FFS and new activities to improve the quality and effectiveness of training—10 Refresher TOFs and 2 Farmer TOFs—are $3,053,663, $26,971 over the plan in the revised budget. Cumulative underspending at the end of 2002 is thus expected to be reduced to $2,325,867.

Planned activities for 2003 include 16 TOFs as opposed to a planned 2, including 8 TOFs in India, which are being financed by the Karnataka Government and assisted with supplemental funding by the Programme, to purchase of items which cannot be procured locally; 1,450 FFSs (compared with a planned 1,626 in the revised budget); 10 RTOFs, at a cost of $50,000 each; 29 FTOF, at a cost of between $7,000 and $12,000 per course, depending on the country; and three additional workshops in impact assessment, facilitator skills and policy implementation. Expenditures are anticipated to be at least $3,682,682, as opposed to the revised budget plan of $2,695,637; underspending at the end of 2003 would be reduced to $1,338,822.

As no spending was anticipated in 2004 in the Implementing Agreement and only a partial year’s spending anticipated in the revised budget, expenditures in this year will result in eliminating the unspent funds in the budget and are likely, as project training activities are expected to continue at full swing, to result in above-budget spending if current plans are realised. While no additional TOFs will be held in 2004, 1,700 FFSs are anticipated (compared with 0 FFSs in the revised budget), at a cost of $500 each in China and perhaps $350 each in other countries. Plans are for an additional 12 RTOFs and 59 FTOFs.

In 2004, the shortfall in allocated spending for professional staff will develop, both because of the increase in staff from 4 to 7 persons, and under-budgeting in the revised budget. Programme activities would be seriously hampered if the project were to end on October 16, before the agricultural year’s activities are completed, and before time could be spent to wrap up activities in the field and in Bangkok. There will also be a shortfall in spending for general service staff, which is running more than $50,000 per year above levels in the revised budget for 2002.

Any additional initiatives, such as a policy level meeting at the ministerial level and the publication of a book on cotton ecology, are not currently funded.

Thus actual spending in 2004, if current plans are carried out, would be a minimum of $3.7 million, $2.4 million above the $1.3 million anticipated in the revised budget. As underspending up to 2004 was only $1.3 million, carrying out planned activities would result in expenditures exceeding budgeted levels by $1.1 million. Additional expenditures could rise above this amount, depending on the extent of additional initiatives not included in the Implementation Agreement.

The review team wished to compare expenditures with budgeted funds by activity, especially training, but were stymied by changes in FAO’s reporting which made...
these comparisons impossible given the time allotted for the mission. For example, the budget categories in the Implementing Agreement and the revised budget for training assumed that the Programme would pay for all training directly; however, all training in China is actually carried out under Letters of Agreement and included under the category “Contracts.” Also, travel associated with training activities was included under training in the original budgets but expenditures for training related travel are now included in the “Travel” category.

According to the justification for Budget Revision C, transfers have been made from other accounts (including “In Service Training” and “Non-expendable Equipment”) to provide funds for the increase in staff costs. Funds were transferred from the In Service Training account to Contracts to fund facilitator and farmer training in China. In addition, a line item in the Implementing Agreement budget, Local Operational Services, which was included to account for the difference between normal FAO overhead and the agreed 5.62% overhead in this project, was reallocated first to accounts for Consultants and In Service Training and then to Technical Support Services.

In the period from 1999 through the end of 2002, actual spending for salaries is only 6.6% above levels in the revised budget, despite the additional positions approved and the impact of cost increases due to the original formulation of the budget in 1995. It is expected that salary costs will significantly exceed budgeted levels in the remaining two years.

Actual expenditures for Expendable Equipment and Non-expendable Equipment are only 40% and 70% of budgeted levels as of the end of 2002. Expenditures allocated to these categories are expected to continue to remain below budgeted levels in the remainder of the project.

A comparison between actual and budgeted expenditures in the categories Consultants, Contracts, Travel and Training is not possible, as discussed above, in the limited time frame of the mission.
7. FUTURE DIRECTIONS

Achieving the objectives of the project — a sustainable system of farmer education in IPM and other ways to improve productivity in cotton, through the FFS approach— depends to a great extent on the willingness of local institutions to take over the funding of these activities. The increase in profitability associated with reduced use of pesticides through an IPM approach fostered through Farmer Field Schools can be demonstrated. In the Programme, these activities are financed largely with donor money. In the future, other organisations must come forward with support.

Evidence already exists to suggest that local government units are willing to take on part of the costs. In China, towns and provinces are already financing FFSs on their own, especially in other crops in areas where cotton FFSs have been conducted. In the Philippines provincial governments have indicated their willingness to share in the cost. In India, the government of Karnataka plans to support 8 TOFs in 2003 with its own funds. Thus at mid-point in the project, there is reason to believe that significant progress will be made by the end of 2004 toward the aim of local funding for Farmer Field Schools.

In some countries, the willingness of local institutions to take over funding for these training activities is problematical. In Bangladesh, there is little connection between Programme activities and other projects or other institutions in the country, relating to IPM, pesticide control or agricultural education, and there is the risk that, when programmed funding ends, the activities will also end. In Vietnam, the Programme is seen to be effective both in IPM training and in promoting cotton production in the country; however, when outside financial support for the activities ceases, government institutions will have to take a hard look at the costs of extending cotton production activities through Farmer Field Schools with the costs of more traditional extension approaches, and may opt for the latter, especially considering the anticipated need to hold spending in check given the significant subsidies to cotton production in the country. In the Philippines, while there is a national commitment to IPM and to farmer participatory education, cotton production is currently financed by private companies who specify an input package provided in kind. If these private companies do not buy into farmer decision making, which would not be their natural inclination, through substantial and increased involvement in the concepts of the Programme, the Farmer Field School approach will likely not go forward in cotton production. Lessons learned in other countries that will have successfully begun the transfer of the responsibility for farmer participatory training to local institutions at the end of the project may be able to assist these countries take steps in the future to make their own programs sustainable.

The sheer number of cotton farmers in Asia is a daunting fact to the spread of farmer-participatory IPM. No project can attempt to reach all the millions of cotton farmers in China and India. Assuring the spread of farmer participatory education in a low-cost way is crucial for sustained application of the ideas of this project. It is clear that the neighbours of participants in Farmer Field Schools also change their behaviour with regard to pesticide use, and reaching only a portion of farmers can lead to extensive spread of the program, although reaching 25-50% of farmers may be required for 100% spread. These percentages are daunting as well. Thus there will still be work to be done at the end of the project.

Farmer-led facilitation began in 2002. This training will expand exponentially in 2003 and 2004. Farmer-led facilitation is likely to be the future of the program because of its lower cost, though difficulties in spreading the program beyond the village of the farmer-trainer exist and the quality of farmer-led training vs. regular facilitator led
training is yet to be verified. Local extension officials also may not be willing to fund farmer training as opposed to staff training.

It is hoped that the quality of farmer-led training can be evaluated in this project. However, the fact that nearly two-thirds of the FTOFs will be completed only in the final months of the project’s last year suggests that this project will not be able to provide the final word on this issue. A more thorough analysis of the quality issue would only be possible in a second phase of the Programme.

Sustainability of the IPM approach promulgated by the project will also be challenged by the existence of strong pesticide interests in member countries. In some countries governments themselves are involved in the pesticide business, and reduced sales of pesticides, which is certainly an anticipated outcome of farmer participatory training in IPM, will mean reduced financial revenues to support extension and plant protection services. In other countries, private pesticide companies are attempting to subvert the Farmer Field School approach to their own need to market pesticides to farmers. While these efforts have been somewhat stymied by government officials in the Philippines, the pesticide companies are extremely active in Pakistan’s Punjab cotton producing region, for example. The availability of generic pesticides, manufactured cheaply in China and India, and the incentive to profit from their sale to farmers may be substantial obstacles to continuation of the IPM approach in practice, despite supportive government policies. Ultimately, sustainability of IPM will depend on the capacity of farmers to build their own capacity to effectively resist pressures exercised on them. These pressures may be too strong to be dealt with by individual farmers, and they may need to be handled collectively.

Efforts to bring strong pressure on governments in the region to limit their use of pesticides may just be beginning at the end of 2004. Trade issues exist, especially with the membership of China in the WTO, which may assist Programme efforts to improve health and environment while maintaining profitable agricultural production through IPM. Already, the vegetable producers of the region are under pressure to control their use of pesticides if they are to export to the EU and Japan. While cotton is not a food crop, it is indeed possible that the same forces pressing to reduce pesticide use in food crops may be beginning to affect trade in cotton and cotton textile products. Bans on imports of cotton and cotton textile products would not be justified because of residues but because of danger to health and environment in cotton producing countries.

It seems clear that in the future, farmer-participatory education and farmers doing science can only be a sustainable and valuable activity if there is a close connection between traditional research and farmer research. The farmer conducted experiments in the FFSs are based on solid research in the field. Farmers will continue to need guidance and updated training if they are to be successful in using their newly found skills in solving their own production problems. The lack of connection between these farmer extension activities and the research community is apparent in some countries. Despite close connections at the administrative level of the project in China, cotton researchers do not seem to be at all involved in project activities, although efforts have been made to engage them. There is no particular involvement of researchers in Vietnam and Bangladesh. In Pakistan, on the other hand, the formulation of project activities seems to have a close tie to IPM research in the country. In the Philippines, the government agency responsible for cotton research is the implementing agency and administrators come directly from research.

In the future, formal ties will need to exist between researchers and the successors to the project in implementing farmer-participatory IPM. The review team was cautioned
by seasoned observers consulting in Programme activities that these ties will only evolve slowly. If they are pushed, traditional researchers are likely to overshadow and indeed discourage farmer researchers. It is unlikely that this project will be able to show satisfactory development of these ties.
8. FINDINGS AND RECOMMENDATIONS

8.1 General Findings and Recommendations

1. Cotton production in Asia is diverse, and this diversity is clear amongst the partner countries to the Programme. However, the rationale for cotton IPM in all of the partner countries is the risk of excessive use of pesticides and the way in which this maintains poverty and reduces the livelihoods and health of farmers and the sustainability of their farms and environment. The project currently focuses on poor, smallholder farmers who currently produce cotton as a means of improving their livelihoods. In this context, the Review Team recommends that the Programme:

- Permit extension of its local training activities to other crops grown by cotton farmers involved in the project
- Be directed towards cotton growing areas with the greatest need and opportunity for poverty reduction
- Be focused on existing cotton producing communities, not on government schemes to create new cotton farming communities in new areas
- Build up critical mass of trainers and trained farmers in specific areas that allow for autonomous spread of cotton IPM technologies and approaches.

These recommendations have implications for decisions at the national level which are addressed under 8.6.

2. The Programme model of TOF/FFS has proven effective in all countries. It has been shown to be transferable to many agricultural systems in which cotton is produced, to remain recognizable and to deliver consistent benefits to farmers in the form of

- reduced pesticide use in cotton relative to non-IPM farmers
- increased biodiversity in the agro-ecosystem
- increased net income to farmers
- enhanced confidence of farmers
- improve experimental skills and capacity to research and solve problems
- improved communication skills with benefits in the home and community

The Review Team commends this progress and recommends that the Programme pay particular attention now to:

- Demonstrating the positive impact of IPM on farm communities in terms of improved income and its use to reduce poverty and improve livelihoods, relative to baseline studies
- Establishing the contribution of IPM to improved health
- Improving the capacity to include women and capitalise on their important role in cotton production in IPM training
- Supporting IPM follow-up activities, including self-sustaining farmer groups, and backstopping extension services in addressing new challenges for cotton production.

3. Besides demonstration of the positive impact of farmer training on a significant scale, evidence of sustainability of cotton IPM in Asian countries will require:

- Demonstration of mechanisms for cost effective scaling-up, e.g. farmer to farmer training and diffusion of IPM knowledge and skills.
- Effective engagement of the research community, including institutes and universities to work with farmers on farmer-relevant research needs.
- Effective engagement of NGOs which can help to sustain and spread IPM.
- Effective engagement of policy makers to build active national IPM policy and programmes and to implement measures which reduce use of unnecessary or dangerous pesticides by cotton farmers, including legislative measures.

The Programme has focused to date on training and measurement of its impact. This is appropriate because engagement of researchers, NGOs and policy makers must be made on the basis of convincing evidence for the success of IPM training and farmer empowerment. The Review Team **recommends** that the Programme now increase activities relevant to achieving its second two objectives, involving cooperation and policy change, in order to provide the evidence identified above.

### 8.2 Project Objectives and Design

The Programme Management Unit shares and communicates a clear vision for the Programme’s objectives and strategy. However, a proliferation of logframes now creates some uncertainty about formal project strategy. There is no need to further refine logframes, which are initial planning tools, but the Programme will now benefit from a clearly articulated strategy for its remaining period. The Review Team **recommends** that a strategy be prepared which will present the overall and specific objectives of the Programme and identify clearly the project beneficiaries. The strategy should describe the activities necessary to achieve the objectives for each partner country and regionally, to the end of the project. The strategy should be supported by annual work plans for PGMU and PMUs that are revised as necessary. This strategy will be useful for the preparation of a subsequent phase of the project.

### 8.3 Farmer Training

1. High quality Training of Facilitators (TOF) and Farmer Field Schools (FFS) have been executed in all partner countries, and the Review Team saw strong evidence of the impact of training on improving income relative to non-IPM farmers and on improved skills, confidence and satisfaction of facilitators and farmers. The Programme has addressed initial delays in TOF/FFS training aggressively, and is now on target with TOF, such that target FFS will be achieved by the end of the project. At the same time, the Review Team supports the priority placed by the Programme on maintaining and improving the quality of training, if necessary at the expense of quantity, and **recommends** that monitoring of quality of TOF and FFS training be used to support efforts to maintain quality in the Programme.

2. The Review Team acknowledges the fact that several governments are keen to use the present momentum that has been built up in cotton IPM/FFS, as an entry point for reform of extension services. The project teams should be **commended** for their significant contribution in this regard. The Review Team **recommends** that the Programme use this window for mainstreaming FFS.
methodologies creatively and for considering different emerging training models and assessing their effectiveness in specific contexts. Quality concerns remain central but should not prevent the project from experimenting with "leaner" and less costly training models. Finding the right trade-off between quality and quantity is the issue here.

3. The scale of smallholder cotton production in partner countries is such that no national programme is likely to achieve training of all farmers by the TOF/FFS process, due to its cost and particularly to the unrealistic need to fully utilize and expand existing extension services to achieve this end. The Review Team commends the view of the Programme that effective scaling-up requires the development of farmer-facilitators and farmer-to-farmer training, backstopped by dedicated extension service staff, or similar technical and training support from the NGO sector. The Review Team notes that FTOF has been initiated in a number of countries already and that there is an ambitious plan to increase FTOF and F2FS for the remainder of the project. The Review Team recommends that this expanded activity include evaluation of the quality and cost of training by farmer-facilitators so as to help determine its potential for contributing to scaling-up in a future phase.

4. The spread of IPM knowledge and skills beyond trained farmers to neighbours and other community and family members is an important element of scaling-up. The Review Team commends the current measurement of this factor in the design of FFS evaluation and recommends that it be expanded to measure more indirect spread of IPM practices and their contribution to Programme impact. The Review Team also recommends that the Programme consider ways and means to obtain additional information relating to social cohesion achieved, problem-solving abilities enhanced and changes in the status of gender that can be attributed to participation in Farmers’ Field Schools. If it is decided that this is worth pursuing, it will likely require special studies, or additions to existing studies, and would have resource requirements.

8.4 Other Studies

1. The Review Team recommends that the results of the 2001/2002 farmer research on Bt cotton be carefully analysed and published at the national and international level if appropriate. Further, it recommends a continuation of farmer research and incorporate Bt cotton into IPM training in China and India. The EU may wish to evaluate the contribution of the parallel research project on Bt cotton to this activity.

2. The Review Team recommends that the cost/benefit analysis of the comparison of IPM and farmer practice in farmer research in various countries be reviewed for consistency and comprehensiveness, with a view towards its use in promoting IPM practice in cotton production as a whole, e.g. demonstrating external costs associated with pesticide use as a basis for policy change.

3. The Review team commends the project for its efforts to highlight the role of women in cotton IPM. Special studies and experiments presently being undertaken, like the Women's Open School in Pakistan and the all women FFS in Dharwad, are relevant and timely initiatives. Also the health studies being undertaken have a special significance for women (both adult women
and young girls), as they are an important risk category for pesticide poisoning. The Review Team recommends that the results of these studies and experiments be analysed and compared. They would serve as a basis for a more elaborate strategy to involve women in IPM. Such a strategy would be helpful to get more women involved in a manner that is in accordance with their involvement in cotton production. This would be important for over-all programme efficiency, effectiveness and impact. There is a need to differentiate between different categories of women in each area and to regional variations. This calls for flexible country-specific strategies. Specific attention would have to be given to:

- Incorporating a module on gender analysis in TOF and FFS curricula.
- Timings and venue of TOF/FFS and their suitability for women participants.
- Suitability of existing training curricula for women participants.
- Potential and limitations of female farmer-facilitators.
- Bringing in more female expert facilitators and facilitators
- Exploring the potential for strategic linkages with national/local women’s organisations..

4. The Review Team commends the efforts to improve collection, organisation and dissemination of information within the Programme, and recommends that the Programme now pay attention to:

- Preparation of information resources for engaging research, NGOs and policy makers, e.g. country level IPM newsletters, videos.
- Publication and dissemination of results outside the Programme, with the assistance of the Global IPM Facility
- Provision of a service to partner countries to keep them up to date with useful global information and contacts relevant to their own efforts and needs, e.g. in the areas of measuring economic costs of pesticides, models for pesticide policy change, health effects of pesticides, etc.

The Review Team recommends that a global review of cotton IPM is no longer relevant and that these resources should be directed towards these other areas.

8.5 Budget and Expenditure

1. Additional funding will be required to complete the expanded farmer training programme now underway and insure an orderly conclusion of the project and/or transition to a second phase. The Review Team recommends, as a result of its assessment of the budget, expenditures to date and plans for 2003 and 2004, that the EU be asked for supplemental funding of the equivalent of US$2 million.

2. The Review Team is aware that the SCPO for this Programme will retire soon and will not be replaced. Given the efficient management of this complex regional project to date, the Team recommends that new budget holding arrangements ensure that the project continues to be managed from Bangkok and that sufficient financial support for this is provided within the PGMU.
8.6 Future Directions

1. The Review Team has considered the future of the Programme and feels that it is justified to consider a second phase. This would permit:
   1) The transfer of successful programme models to all countries in the region
   2) Thorough evaluation of the efficacy of farmers training farmers (FTOF) and its role in scaling-up farmer training
   3) Transfer of the responsibility for farmer participatory training to local institutions
   4) Development of solid progress in the implementation of national IPM policies and the institution of policies to reduce pesticide use directly in response to growing international trade concern about food and product safety
   5) Development of solid ties between traditional cotton researchers and farmer researchers
   6) Expansion of IPM methodology to the other crops grown in a cotton-based farming system

Therefore, the Review Team recommends that an identification mission be commissioned with Terms of Reference which would include:
- The examination of models for scaling-up that have been developed in this project and in other work
- The assessment of the status of cotton IPM development in Programme countries and prospects for its development in new countries in the region, in the context of maximizing benefits relative to costs
- The exploration of the scope of including other high-pesticide using crops in a project focussed on cotton-based production systems.
- The examination of the appropriateness of more work on pesticide effects, e.g. including a ‘pesticide incidents survey’ component, in line with the Rotterdam Convention.

8.7 Recommendations for National Projects

BANGLADESH
- The Review Team recommends that the FAO Representation in Bangladesh act to obtain signing of the Technical Assistance Project Proforma (TAPP) covering the project.
- The Review Team recommends that FAO facilitate active links between various IPM programmes being implemented in the country under DAE and NGOs, by arranging semi-annual meetings to discuss areas of common interest.

CHINA
- The Review Team endorses the emphasis given to farmer-to-farmer training and recommends that performance of F2FS be specifically compared to conventional FFS training.

INDIA
- In view of the scaling-up initiatives taken by the Indian Government and the new challenges this poses to the project, the Review Team recommends that existing national expert capacity be diversified in order to address these new challenges, to include skills in policy analysis and strategic linkage skills. The existing team size may be sufficient.
• The mission recommends an increased allocation of funds to FTOF and F2FS, as opposed to TOF and FFS, as this appears to be a more sustainable way to scale up operations in a country like India. India could draw upon the experience of China and Vietnam in this area.

PAKISTAN
• The Review Team notes the important initiatives made by the project and the success of TOT/FFS in Sindh. Given the great importance of demonstrating TOT/FFS in Punjab, as a critical province for cotton production and policy change, and bearing in mind Recommendation 8.1.1, the Team recommends that resources be directed to further accelerating TOT/FFS there.

PHILIPPINES
• In line with Recommendation 8.1.1, the Review Team recommends that the project moves its primary area of operations to Mindanao as soon as possible and not increase operations in marginal areas of Luzon in particular.

VIETNAM
• In line with Recommendation 8.1.1, the mission recommends a continued focus on the most important cotton-producing areas and does not endorse a shift of activities to proposed new cotton areas like the Mekong Delta.
9. APPENDICES

9.1 Country Reports

9.1.1 Bangladesh

Relevance of the Project to national priorities and needs

The total area under cotton cultivation has grown from 24,000 ha in 1990 to 38,000 ha in 2002, which is 0.7% of the total cropped area. The local production covers just 10% of the country's total needs for cotton. The Government of Bangladesh is committed to increase cotton production. However as the scope for expansion of cotton area is limited the primary concern is to increase productivity of the existing area under cotton.

Cotton is not a major crop in Bangladesh and cotton farmers form 0.2% of the total farming population. These are predominantly small-scale and marginal farmers, growing a range of crops, and cotton forms an important source of income for them. In the Bangladesh context therefore this project is predominantly relevant in relation to poverty reduction, environment and health. Cotton gets as many as 10 to 20 pesticide applications per season. Pesticides have become less effective against target pests and the current magnitude of pesticide use threatens health and farm ecosystems. Many cotton farmers intercrop vegetables with cotton and thus there is scope for health and environmental benefits.

IPM is not new to Bangladesh. Since the pioneering efforts of the FAO Inter-Country Programme 1981, there has been a series of government- and NGO-led IPM projects, most of them following an FFS or similar participatory approach. Focus has been on rice and vegetables. This long experience in IPM has assisted the formulation of a National IPM policy. The present project fits well in this policy context and is a welcome addition to other IPM projects.

Project operation and design

The project is implemented under the auspices of the Cotton Development Board. This has the advantage of having a direct institutional link with the institution that is the prime mover of cotton production in Bangladesh. Commitment of CDB top management has been high to get this project on the rails and help it to overcome several procedural difficulties. However, the institutional support depends on persons committed to the project and is therefore somewhat fragile. A limitation of the present institutional arrangement is that the project focus on poverty alleviation does not completely match with the priorities of the CDB which are commodity focussed.

The over-all project objectives were operationalised in a country logical framework which specified impact targets and indicators of achievement. Country specific indicators have been worked out under each heading. The country log frame clearly reflects the emphasis of the Bangladesh programme on IPM training through ToF, FFS, and its contribution towards poverty alleviation. The log frame provides a useful guideline for performance of FFS farmers.
Status of Project implementation

Sixty-nine field staff from CDB and five cooperating NGOs were trained in two TOFs and 1,275 farmers have been or are being trained in 51 FFSs (5 completed and 46 in progress). In addition, curriculum development and field experiments with plant compensation, water management, compost, spacing, etc. are well organised. In collaboration with Unnayan Dhara, a local NGO, an FFS on composting and soil health has been taken up on experimental basis. Training and field experiments are still somewhat standard in nature. They could address more locally relevant subjects, such as intercropping of cotton with vegetables. An introductory module on gender analysis would also be useful.

With involvement of 8 students from the Bangabandhu Sheikh Mujibur Rahman Agricultural University, a baseline survey of impact assessment has been conducted which followed by and large the standard design.

Complex procedures for the disbursement and management of funds, both in Bangladesh and at FAO, have led to serious operational problems. A Technical Assistance Project Proforma (TAPP) agreement should have been signed between FAO and The Government of Bangladesh, as per its formal requirements but this has not happened. FAO and CDB have sought temporary solutions in order not to endanger the progress of the project. It is due to the personal commitment of several key people involved in the project that it has succeeded in making substantial progress in the field while having to deal with these hurdles.

Project results to date

Training overall is of high quality and well organised. It has induced interest and enthusiasm among the participants. Much importance is given to monitoring and follow-up of training. So far, less importance seems to have been given to Programme objectives on co-operation with other institutional actors and on policy aspects.

The involvement of women is very limited. The reason for low women involvement is primarily the fact that there is no women staff in CDB and male staff do not have a great gender sensitivity. Some female NGO staff does participate and they in turn are instrumental in bringing women into FFS. This aspect needs to be strengthened. Like elsewhere, women do play a role in cotton production, both as workers and as household decision makers.

Sustainability at the national level

The project should continue to concentrate on implementation of high quality ToF and FFS to arrive at a critical mass of competent facilitators. Field experiments in the context of ToF should focus on specific, locally relevant issues instead of wider area of cultivation, farming and pest management. Key for sustainability will be the successful transfer from ToF to FTOF and farmer-to-farmer training, communication and networking.

The project should aim to improve the livelihoods of the poor, contributing at the same time to better health and an improved environment. Project strategy should gradually include other aspects of cotton-based farming systems. Keeping in mind the Bangladesh project emphasizes poverty reduction, gender is an issue requiring more attention. Also other socio-economic aspects require more attention, notably farmer organisation and credit. A strengthened collaboration with NGOs that are
qualified to address these issues would be useful. Possibilities for a closer link with DEA and with agricultural research institutions need to be explored.

The National Integrated Pest Management Policy should be fully operationalised after signing of the document by the Prime Minister recently. It forms a good framework for moving IPM "beyond" projects and for progressing the policy objectives of the project. Greater co-operation between various government-, donor- and NGO-supported projects and organisations involved in IPM could contribute to the development of a coherent IPM strategy at the national level and share human resources and knowledge more efficiently. Such a strategy would be important for assuring government backing in the long run for cotton-based IPM. Though this project cannot initiate such a process on its own, it would be worth increasing dialogue with other IPM projects, perhaps with the assistance of DAE and FAO.

9.1.2 China

Relevance of the Project to national priorities and need

China is the world’s largest producer of cotton, which is used as a raw material for its textile industry. The country is actively developing cotton production, e.g. through extending production areas in Xinjiang Province, and is at the forefront of Asian cotton research with development and deployment of hybrid and transgenic varieties.

In the 1990s, cotton area declined in what had been the major producing area along the Yellow and Yangtse Rivers, due to problems with the cotton bollworm. Pesticide applications rose and have remained very high, often over 20 sprays per season.

The project 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 would be expected to result in less environmental pollution and improved health among cotton farmers. There is a history of biological control (and more recently biotech) research for control of cotton pests, and considerable national experience with FFS in rice, vegetables and to a limited extent, cotton. Thus, the project is considered very relevant for China.

Project operation and design

The project is implemented by the National Agricultural Technical and Extension Services (NATESC). Since March 2001, an international IPM officer has been attached to the project, posted in Beijing but with extensive time spent in the field. 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. The project entered into two service contracts – the support to a Bt cotton study and a consultancy on biological control by a Thai consultant who assisted in two ToF.

Project efforts are concentrated on three provinces, Shandong, Anhui and Hubei. More limited activities are also conducted in Henan and (in 2002) Sichuan Provinces. The project focused in the first instance on training extension staff as facilitators and holding of FFS. Over time, it has been realised that extension-facilitated FFS will never be able to reach a critical mass of farmers and more emphasis has been given
to farmer-conducted FFS as a long-term strategy. This, however, is a fairly recent development.

Farmer research has been an important follow-up aspect of the project in China. Because of the extensive area planted recently to Bt cotton, 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 being conducted by a Ph.D. student on “Economics of Resistance Management – a study of Bt cotton in China”. The mission feels that this work is highly relevant and it was most appropriate for it to be conducted within the framework of the Cotton IPM project.

**Status of Project implementation**

The project appears to have been implemented very effectively thus far. In the three years of operations, 184 provincial and local extension staff have been trained in ToF; 7402 farmers have participated in FFS; 60 extension staff have been trained in RToF. In 2002, 53 farmers were trained as facilitators in FToF and 555 persons trained in FFFS. National planning and review meetings were held annually. The planning and review meetings were separate until this year, when they were conducted in a single workshop. This made sense both substantively and financially. Two curriculum development workshops per year for ToF have been held and additionally, a curriculum development workshop was held on coloured cotton this year in Sichuan. Curriculum development workshops are normally for one week. In order to exchange experiences, cross-province and intra-province visits have been carried out annually for 2-3 days each (a total of 8 visits so far). The project also funded an English language training course for facilitators.

The project is carrying out the special study on Bt cotton mentioned above, and like other project countries, an IPM Impact Assessment Study is being carried out.

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**

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). Independent study, in cooperation with Hannover University suggests the importance of seed quality in gain to 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 average yields.

The cost of training regular facilitators (around US$2500 each) is very high in China, while the cost of training farmers in FFSs, at about US$11 each, appears comparable
to other countries. The cost of training farmer-facilitators is said to be about RMB 2000, or US$250, substantially less than the training of regular extension personnel (two week training as opposed to four month training). The budget for this activity, US$9,000, would assume that the cost was even less—US$170 each for 53 farmers.

Perhaps 1/3 of participants in FFSs are women. Obstacles to participation by females are family duties, though male participants indicated that their wives were fully committed to the IPM approach and the preservation of natural enemies in the field. The review team heard directly from one female farmer trainer and gained an appreciation of the difficulties of females conducting training, doing farming and managing family activities.

An impact assessment study is presently on-going. Baseline data were collected in 2000 and information collected in the year after FFS are conducted, following the methodology established by the project. The mission received a list of information that the study is to obtain, but the actual questions being asked were unfortunately not available in translation.

There is limited but growing communication between traditional cotton researchers and farmer-led researchers. Farmer co-operation and communication with extension workers appear to be enhanced by farmer involvement in research in FFS.

**Sustainability at the national level**

Substantial commitment of provincial and local governments to co-financing FFS is a strong indication of national interest in IPM implementation beyond the end of the project. Farmers from FFS have considerable interest to extend IPM methods into other crops, and to get more training for this.

The sheer numbers of cotton and other farmers in China makes the spread of FFSs challenging, though with sufficient spread of the project’s activity, multiplication of FFSs can be expected through local initiatives. Use can be made of existing FFS training capacity in rice. Farmer-led facilitation began in 2002 and is likely to be the future of the Programme (because of lower cost), though difficulties in spreading the programme beyond the village of the farmer-trainer exist. The willingness of local officials to fund farmer training as opposed to staff training could be an obstacle. Expansion of the number of FFSs with farmer trainers assumes that the quality of farmer-led FFS training is comparable to that of regular extension agent led FFS training and this assumption should be evaluated, perhaps through a comparison of pre-FFS and post-FFS testing in regular FFS and F2FS.

**9.1.3 India**

**Relevance of the Project to national priorities and needs**

India has the largest number of cotton growers in the world. Major cotton growing states are Maharashtra, Andhra Pradesh and Karnataka in South India and Punjab and Haryana in North India. Cotton, though covering only 5% of India’s total cultivated area, accounts for 54% of all the pesticides used. This has led to serious environmental problems, and has threatened the economic viability of cotton production, resulting in downward trends in cotton cultivation. For many small and
marginal farmers involved in cotton cultivation it has resulted into a chronic debt situation, with cases of "cotton suicides" becoming a recurring feature.

The Government of India and the State Departments of Agriculture are aware of these problems and are trying to address them, for example through launching a Technology Mission for Cotton (TMC). So far, these efforts have not resulted in important breakthroughs. India has a long history in cotton pest management technology, including biological control and comprehensive efforts have been made to disseminate these, following the Transfer of Technology model. Though many researchers and extension staff were trained, the actual dissemination to farmers has been limited. India is on the verge of introducing Bt cotton technology for pest management.

IPM based on the FFS model has been widely practiced on rice, and preliminary work has been done on cotton and on other crops. Various NGOs have used similar participatory and community approaches in pest management projects. The Government of India has embarked on a process of institutional reform of its huge extension system. It welcomes effective innovative approaches that can be absorbed by the system and that will help in moving towards a leaner, more demand driven extension system with space for private initiatives. Given all this, the project is very relevant to India.

Project operation and design

The project PMU is based in Hyderabad and operates under the auspices of the Directorate of Plant Quarantine and Storage of the Ministry of Agriculture. It provides technical support, through its IPM training programmes, to the State Departments of Agriculture. Staff of State Agricultural Universities and Research Institutes act as resources for the training. NGOs form a secondary target group in TOF training.

The Indian project focus has so far been on training in South India. The project has so far given relatively less importance to the development of synergy with other actors in the Cotton IPM knowledge system. It has sought to influence national and state level policies primarily by demonstrating the validity of the IPM FFS approach through its training. The project is currently concentrating on Northern Karnataka, Maharashtra and Andhra Pradesh. Tamil Nadu, Punjab and Haryana are addressed to a lesser extent.

Status of Project implementation

The training programme has progressed well. The project is reasonably on schedule vis-à-vis its targets (total 7 ToFs planned for the entire project, 5 implemented to date; 1,200 FFS planned, 317 implemented thus far with the remainder scheduled for 2003 and 2004). Participants in ToFs are primarily DoA extension staff, there are a few researchers and about 20 % of the participants are from NGOs. In 2002, four F2FS have been implemented. Quality of ToF and FFS appears to be good. Project experts make follow-up visits to FFSs implemented by trained facilitators and refresher programmes are being organised.

Efforts are being made to involve women more effectively in the project. Various initiatives are undertaken to this effect; on an experimental basis, a women-only FFS is being run in Dharwad. Gender has been incorporated in the ToF curriculum. By giving systematic attention to the importance of women's participation both in TOF
and FFS, the project succeeded to increase the participation of women by 20% in 2002, as compared with the previous year. However this is only a fragile beginning. Sustained efforts to strengthen the women’s component of the project are required.

A detailed study is under way which aims to investigate roles, responsibilities and knowledge of men and women in cotton cultivation, response towards environmental and human health concerns and constraints on women’s participation in FFS. The study is timely and relevant both content wise and in terms as methodology. It is expected to yield insights that will help to design a strategy to involve women more effectively in IPM. The study is expected to have relevance for other country programmes as well.

Impact assessment study is being carried out by an NGO in Raichur and Bellary sub-divisions of Karnataka state, where the FFS were established. The standard design for impact assessment has been followed, except that it was necessary to draw on 8 FFS rather than 4 to get the sample of 100 persons, due to high dropout rates in the first year. Baseline data was collected and season-long data gathering is now taking place.

The present project team consists of a country programme officer, an APO and four national programme experts, an NGO liaison officer and three support staff. This team has been capably managing the programme. It is to be expected however that the existing expert facilitation capacity will not be adequate to cater to the growing demands of State Governments. The project would need strengthening with regard to its new role of providing backing to an ambitious scaling-up process, and also with respect to cooperation and policy components. In addition the project should broaden its network of resource persons and institutions. Some of the responsibilities that are presently being taken up by project staff may be out-sourced to capable expert facilitators (both government and NGO) who have been trained in the previous years.

**Project results to date**

The project has made a promising start in building up a cadre of IPM cotton facilitators. It has demonstrated the relevance of the IPM FFS approach in cotton and created awareness among policy makers, senior government officers, research institutes, NGOs, farmer associations by conducting IPM orientation programmes, providing clear evidence of benefits of economical and environmental benefits of IPM at the meetings etc. and by publishing brochures and by arranging electronic and print media coverage of all activities of the project.

**Sustainability at the national level**

There has been considerable government interest in the FFS model for pest management extension. The Government of Karnataka (GoK) has made an ambitious plan for scaling-up the FFS approach and takes it as a new model for extension. Already one ToF being implemented by GoK with its own resources, and 8 ToFs are planned for 2003; extension staff trained in the project has been made fully available for FFS implementation. At the national level, Guidelines of the Technology Mission for Cotton have been adjusted to include principles of FFS approach. This should be seen as important developments wherein this project has been instrumental.
While some of the State Governments are eager to scale up the IPM training programme at a rapid pace, the enthusiasm may reflect more a desire for a new way to operate extension. There is perhaps insufficient appreciation of the unit costs of FFS as an extension method. The project needs to make a comparative assessment of different existing models of cotton ToF/FFS. By comparing the strengths and weaknesses of different approaches it will be possible to arrive at a balance between quality and quantity, and adjust the ToF curriculum to suit the changing requirements, without compromising on essential quality considerations.

Farmer-to-farmer training is an activity which has just started. It needs to be given greater importance in the coming years. Mid- and end of season workshops, follow-up visits to FFS and formation of IPM clubs should be promoted.

Within the existing training programme, Farmers and Science is an important component that should enable farmers to become active evaluators of technology (e.g. Bt cotton) instead of passive acceptors, and further reinforcement of these newly acquired skills is important.

There has been cooperation with NGOs and universities in the implementation of TOFs and FFSs. However, there is no explicit strategy towards building stakeholder convergence, and there is a risk of duplication of efforts. There is also a need to establish links with suppliers of alternative inputs, and banks. An existing platform for collaborative action with respect to Cotton, the Cotton Round Table, may well be utilised by this project as a mechanism to forge the necessary synergy with a condition for sustainable impact.

9.1.4 Pakistan

Relevance of the Project to national priorities and needs

Pakistan is the world’s fourth largest producer of cotton, and a major exporter. The great majority of cotton farmers are smallholders and there are many tenant cotton growing households. Cotton is grown largely in Punjab and Sindh, with Punjab producing by far the most cotton and exhibiting the deepest poverty amongst communities dependent on cotton production.

Cotton pest problems influence national production. Over the past decade, outbreaks of bollworms, whitefly and cotton leaf curl virus have been particularly severe. There is a strong dependence on chemical pesticides, use of which on cotton has increased about six-fold since 1980. Since 1995, trade liberalization has allowed the import of generic pesticides, increasingly from China. These are typically older, broad spectrum products, and are sold at a very low price. The pesticide industry has very strong influence in the farming community and at the political level.

By reducing dependence on pesticides, IPM would reduce costs of production and could lead to improved rural health. A pilot FFS in 1996 in Vehari (Punjab) demonstrated benefits and attracted interest of farmers, extensionists and the Provincial and Federal government. Pakistan has adopted a National IPM Programme and the FAO-EU Programme is part of it. Given the importance of cotton in the economy and the heavy use of pesticides on it, the project is highly relevant to Pakistan.
Project operation and design

The Pakistan component is part of a new National IPM Programme (NIPM), based in the Pakistan Agricultural Research Centre. Under NIPM, three projects viz., ADB-TA, the EU IPM Programme for Cotton in Asia and AGFUND project on “Pesticide risk reduction in women in Pakistan” are fully integrated into one Cotton IPM Programme. Because of this, it is sometimes difficult to define the borders of the EU-FAO project relative to other IPM activities, but the project benefits considerably from coordination with complementary activities and support from other projects, and the efforts of NIPM to maintain a supportive political environment.

The project is designed to move IPM forward on several fronts. Farmer Field Schools are focused on Sindh, where provincial agricultural services are strongly supportive. Extension to Punjab and other provinces is planned as this becomes more possible. Provincial extension officers run TOFs.

At the same time, the NIPM is pushing government policy change towards IPM in a number of ways, including revision of national pesticide regulations, and studies on pesticide contamination of water, food, and animal feed in cotton growing areas are being revised. Following an FAO-UNDP assessment of pesticides in Pakistan, the project has launched a study of externalities associated with pesticide use, to derive a true benefit/cost ratio for pesticides. Health effects are a major, and potentially high profile, element of externalities, as they affect mostly women who are employed harvesting cotton. A study on pesticide effects on women seeks as well to initiate women’s participation in cotton IPM. A study on pesticide residues in food and water in cotton growing areas is underway.

Programme managers, working from within NIPM, have a clear rationale and plan for the project. They perceive a current window of opportunity for change and believe that strong, concerted action is necessary over the next few years. The programme is ambitious and earnest. At the same time it is fragile, run by a few advocates who must constantly re-lobby changing officials.

Status of Project implementation

The training programme has progressed very well. Training activities began with two ToF in 2001 and 25 FFS. After completion of two ToFs during 2001 with the support of EU, 94 FFS in six districts of Sindh, namely Hyderabad, Sanghar, Nawabshah, Naushehro Feroze, Khairpur and Sukkur have been organised in the current cotton season. Out of 94 FFS, 15 are being run by the farmers or Field Assistant facilitators, six by NGOs, while one is run by a woman facilitator for 27 women participants with age range of 13-48 years. Through these FFS, about 2,300 farmers will be trained.

Two ToFs with 13 FFS mainly funded by the ADB TA but partially supported by the EU project have been organised in Sindh (Mirpur Khas) and Punjab (Bahawalpur) provinces. At the two ToFs, 63 participants including extension workers, researchers and NGO personnel are undergoing season-long training in cotton IPM. The 13 associated FFS have registered over 300 farmers for the training.

On-farm participatory research in conjunction with FFS is being done at farmer fields by the farmers with the support of facilitators. Two special studies were also initiated under the TA, one on the effects of pesticides on women’s reproductive hormones (through blood analysis) and the other on effects of pesticides on soil biomass.
An IPM impact assessment study was initiated in 2001 with the support of EU and during the period, household survey for baseline was planned and conducted. An international consultant/Agricultural Economist was fielded (July 2002) by the ADB TA to assist the national experts in streamlining the study.

**Project results to date**

The formulation of a national IPM programme, which co-ordinates related projects from different sources, is a milestone and indicates commitment towards IPM. The Cotton IPM Programme has made an important contribution towards strengthening this national programme.

Both ToF and FFS training carried out thus far was of good quality. The studies underway in the project or linked to the project through the NIPM have had good initial results. Dramatic levels of contamination of water, food and animal feeds with a range of pesticides, many obsolete, have been found. Maximum residue levels are often exceeded. There is a need to complete and publish these important findings.

Studies on poisoning of women, who harvest pesticide treated cotton, have demonstrated widespread toxicities during cotton seasons. This needs now to be related to longer term impacts on health, and contacts need to be made with national and international expertise in this area.

The study of external costs of pesticide use has generated dramatic results, with benefit to cost ratios possibly lower than one. Continued collaboration with international partners, particularly Hannover University, is desirable to develop this further, and to explore international models for changing pesticide use and policy. The Rotterdam Convention offers particularly possibilities and should be look into.

The mechanism and methodologies of TOFs and Farmer Field Schools were introduced to the Women’s Open School (WOS), which started at September of this year, is one of aspects. 28 facilitators are being trained, while each 2 participants are facilitating one WOS (about 14 women in one WOS) as a practice. These activities provide opportunities to women to identify real issue of their daily life which are related pesticides through group discussion on self-feelings, village-mapping, possible preventive actions etc. It will not only address to IPM but also will address to gender/social issues start from family, village level to upper levels, which will help women to explore/build up their further roles in the families and villages in many respects.

**Sustainability at the national level**

There are good prospectives for sustainability, given the effective NIPM, the dedication of the project team and the quality of initial TOF/FFS. The government is likely to give long-term funding to NiPM within the next year.

However, the project faces a very strong lobby from pesticides importers and retailers. Moreover, extension services are also involved in selling pesticides to farmers, an obvious disincentive for them to promote IPM. In this context, individual farmer’s decision is key to curb the pesticides consumption.

To increase sustainability, training needs to be extended in Punjab, even though the political climate for this in Punjab is not favourable, partly due to the much stronger
pesticide lobby there. Planned devolution of extension from the provincial to the
district level will benefit the project and sustainability, allowing more local community
engagement and, hopefully, less political and pesticide company interference.

The project needs to foster more cooperation within Pakistan. The NIPM is in a good
position to do so, and prospects for research collaboration are improving. A plan to
extend IPM training to schools and universities is imaginative and desirable, but
perhaps ambitious at this point given other targets and demands on time and budget.
The lack of rural NGOs poses a problem to FFS follow-up, and more efforts need to
be made there to identify and involve NGOs.

The project is therefore now facing the challenge of keeping the right balance
between an acceptable level of quality (ToF, FFS) and an sufficiently high speed of
dissemination to ensure that the current national momentum is fully exploited.
CABI Bioscience, which assisted the initial TOF, has now moved to a support and
quality assurance role, and presented some convincing analyses of quality problems
and possible solutions.

The NIPM’s plan to move IPM forward on all fronts is laudable, and the flexibility of
the FAO/EU project in enabling this has been important to progress and a good
return on investment. The project is seeking increased funding to implement its many
activities. While this may not be possible from the current project, the PMU should
consider enlisting the help of FAO and EU in finding counterpart funding for specific
new studies. While the rapid development of the Pakistan project is very impressive,
care must be taken that it does not get too “thin”. Overall, there is a need for
consolidation of activities initiated so far, so as to ensure their likelihood of success.
Some new initiatives, such as developing IPM curricula for schools and universities,
may have to wait for more funds and human resources to become available.

9.1.5 Philippines

Relevance of the Project to national priorities and need

Cotton hectarage has decreased dramatically, from about 35,000 ha in 1992 to just a
few thousand today. Pest problems contributed to this early on, but more recently the
underlying economics of the commodity have compelled farmers to switch to other
crops. The country no longer actively pursues the expansion of cotton production,
leaving development of the crop to the private sector, with assistance of the
government in extension and research. If cotton is to be a viable source of income in
Philippine farming, it will have to be with reduced reliance on chemical insecticides
which represent the largest cash outlays (more than one-quarter of seed cotton
production costs) and use of labour in cotton production.

Increased income for farmers is the primary development objective of the project.
Training farmers to grow cotton with reduced use of insecticides should contribute to
more profitable cotton production, which could make cotton production sustainable in
the country. The IPM and FFS concept is well established in the Philippines, due to a
long associated with rice IPM and a strong national IPM policy and programme
(KASAKALIKASAN). However, the very limited area planted to cotton calls into
question the viability of the Philippines project, unless it can expand into suitable
areas (e.g. Mindanao).
Project operation and design

Agricultural extension in the Philippines is decentralized and under the responsibility of LGUs. The project is implemented by LGUs and the Cotton Development Authority (CODA), a very small Governmental body that took over some of the functions of the now-defunct Philippine Cotton Corporation. CODA provides extension on cotton, research and some ginning services.

The Philippines project was originally conceived differently than in other countries. Because so many farmers had been trained in rice and corn-based IPM and because the cotton IPM project was intended to operate in some of the same areas, it was decided to dispense with FFS training and concentrate on Participatory Technology Development (PTD). It was intended that participants would be FFS graduates who would apply the techniques learned in the rice and corn IPM FFS to conduct field-based research on cotton production problems, with facilitation by trained extension workers from local Government units (LGU) and the national IPM programme (KASAKALIKASAN). It was felt that this would take advantage of skills gained previously and allow farmers to more easily apply the lessons learned from previous IPM training to cotton.

When the beneficiary identification process began in the intended first-year project areas (Ilocos Sur and Pangasinan Provinces, Luzon), it was not possible to find a sufficient number of farmers who had previously taken part in FFS. Thus, the first-year programme had both FFS-graduates (about 25%) and new farmers (75%). Of the five sites for the first year of the project in the Philippines, three were designated FFS and two were PTD, but in a practical sense there was not much difference between them.

Status of Project implementation

The project began later in the Philippines than in other countries. Although the Philippines was originally intended to participate, areas under cotton production had decreased so dramatically that the Philippines was not included in the first year of project activities. An FAO mission was sent to the country in 2000 that recommended project activities could begin on a limited scale.

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. This was followed by the course itself, which took place over a total period of about one month in three sessions, in November 2001, December 2001 and January 2002. Eighteen persons were trained, divided evenly between LGU facilitators and CODA staff. After the training, another workshop was held in February 2002 to finalize the field exercises and studies that farmers might undertake.

Five FFS/PTD were conducted in 2001-02; three in Pangasinan and two in Ilocos Sur. A total of 84 farmers were trained; 41 in Ilocos Sur and 43 in Pangasinan. The groups met for a half-day each week and lasted 18 weeks. Two field days were held, to inform local officials about the training and to exchange experience. The graduation ceremony was held on May 16.

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. A second refresher training course was held in August 2002, for LGU and CODA.
staff in areas where the project is expected to expand this year (Ilocos Norte and the Visayas).

**Project results to date**

Because of the long experience of the Philippines in IPM, the training appears to have been well conducted and was found highly useful by the many facilitators met by the mission. Although it can be partly attributed to the fact that the project is starting up, the vast bulk of the expenditure so far has been related to facilitator training, rather than farmer training, even though in the Philippines there has not been any of the season-long ToF as in other countries.

The number of facilitators trained (28 in total to date with another 25 planned for training in the Visayas in the coming season) is large in relation to the number of farmers trained. With the abundance of trainers, there have been approximately 6 trainers in each FFS, although the plan is for only 2 trainers per FFS in the future. Due to the concentration of the program in Luzon, where relatively little cotton production takes place, farmers trained may represent over 40% of all cotton growers in some areas. The cost of training trainers has been low relative to that of other countries (around US$560 each) due to the shorter time for residential training. The corresponding cost for training farmers in FFS/PTD, including field days and graduation ceremonies, has been high (around US$50 each).

A relatively large proportion of trainers coming from LGUs are female, while trainers from CODA are primarily male. There are very few female participants in the FFS/PTD (only one in the FFS visited by the review team) as most women stay at home, assisting husbands in the field, though generally not participating in spraying activities.

No work has been conducted yet on project impact assessment. The mission was informed that the methodology for this work, which is intended to be completed after the 2003-04 season, is still being developed. However, the scale of operations for the Philippines component is so low that results may not be very meaningful.

**Sustainability at the national level**

In the near future, there is unlikely to be much expansion of the cotton area in Luzon and the utility of the Philippine component will depend on increased cotton acreage in other areas, particularly Mindanao. This would seem important if the project is to make the greatest contribution to increasing income for cotton farmers.

Assuming this expansion takes place, the extension staff of CODA is inadequate to provide assistance to all potential cotton farmers in the Philippines; LGU and provincial agriculturalists must be relied upon. Little is known about potential support for FFSs at the provincial level, although Negros and Mindanao evidently have promised support if the project is expanded to these areas and there is some limited financial support from the municipality in the current project area (San Fabian).

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.

### 9.1.6 Vietnam

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

Commercial cotton production is centred in south-central Vietnam, and the crop is produced by about 40,000 smallholder farmers, each cultivating generally less than one hectare of mostly hybrid cotton. In mountainous northern provinces, ethnic minority people cultivate tree cotton at a subsistence level for local consumption. Increased commercial cotton production is a priority for the Vietnam Cotton Company (VCC). The VCC is in charge of most of the commercial cotton production in the country, providing input credits and guaranteeing a floor price for the purchase of seed cotton. There are plans to develop new cotton production in the Mekong River region. Here it would be grown as a dry season crop, in contrast to other regions.

Vietnam has experience with serious pest problems in cotton. Intensive production in the late 1970s led to pesticide-induced pest problems, spiralling control costs and collapse of the production system. An IPM approach followed, based on agroecosystem management, reducing sprays from 15-20 to 1-2 per season. Originally the involvement of Vietnam in the project fulfilled more of an expert resource function, given their positive experience. Vietnam is also familiar with FFS through regional programmes on rice and vegetable IPM.

Increased cotton production is the development priority in Vietnam which the project addresses. The project contributes to the goal of sustainable, profitable and environmentally sound production of cotton through the training of farmers in practices which will lead to minimum use of chemicals in cotton production. Low use of purchased chemical inputs will contribute to reduced costs of production, which, in turn, will make cotton production more viable, even in the absence of support prices. Lower pesticide use should result in less damage to the environment and to the health of producers, especially as these practices spread.

**Project operation and design**

Project administration is handled through the FAO-IPM office in Hanoi, to which the Cotton IPM project pays a nominal amount (about $1500 this year). Besides national officers, an international cotton IPM officer is assigned to the project since March 2002. Previously, there was an international IPM officer in Hanoi who partly looked after the cotton project. An APO is assigned to the project and posted at Buon Me Thuot, Dak Lak Province.

The Vietnam Project includes conduct of Farmers’ Field Schools, Training of Facilitators (from the Vietnam Cotton Company, the Plant Protection Department of the Ministry of Agriculture and Rural Development and particularly skilled farmers who previously attended FFS), technical refresher courses, special studies and participation in regional project-related activities. The design of the Vietnam component is appropriate, but the long-term commitment of VCC to FFS as an extension tool still needs to be secured and is an important issue for sustainability of IPM in cotton production. Given the ambitious plans of the Government for cotton
expansion, the capacity being created through the project is unlikely to be sufficient to use IPM FFS in all the new areas being proposed.

**Status of Project implementation**

Through the 2002 season (which was nearing conclusion at the time of the mission’s visit), some 229 FFS had been held and it is estimated that 6,347 farmers will have received certificates for successful completion of the 14-week course\(^6\). Despite efforts to include women, female participants represent only about 13%. Training for technicians was carried out in 2000, 2001 and 2002. In total 92 technicians were trained (64 from VCC, 28 from PPSD), 12 of which were female. At present, there are no more funds for TOF, although a request has been made for further training. Reportedly training costs in Vietnam are considerably below those of other countries. Five courses were held to train farmers as facilitators with 68 persons (3 females) completing the training. Four short-term (3-5 days) refresher courses were held for a total of 74 participants (10 females).

Although none have been completed yet, the project is undertaking special studies on determining ways for increasing women’s participation in the project (with the Vietnam Women’s Union), on project impact (with the Agricultural Economics Department of the University of Agriculture and Forestry (UAF), Ho Chi Minh City) and on biological control-based integrated management of sucking insect pests (with the Plant Protection Department of the UAF). The project also hosted in 2001 two students from Wageningen Agricultural University, who carried out field research on predatory wasps that are natural enemies of caterpillar pests in cotton. Besides the country-based activities, Vietnam hosted regional cotton IPM workshops on impact assessment methods and planning and evaluation during 2001.

Of the activities conducted to date, only the impact study is behind schedule, reportedly due to difficulties in acquiring permits to carry out the local studies and in selection of interviewees for the study. Initial data collection is now taking place. Facilitator and FFS training has been implemented as scheduled.

**Project results to date**

FFSs presently being conducted will end before cotton is ready to be picked and the results of farmer experiments determined, preventing participants from having the opportunity to gain full benefit through the joint discovery of the results and joint consideration of their impact on future cotton production. The longer time period of the TOFs allows the trainers to appreciate these results. Participants in farmer-led FFSs (viewed in a minority ethnic village) appear to be actively engaged in the process. Regular FFS facilitators from the VCC appeared to lecture to farmers, based on the team’s limited observation. Female participation in FFSs is high in minority ethnic villages, where women fully share in field work but low in most villages where women do not do this. A larger proportion of trainers from PPD are female, as opposed to those coming from the VCC, where few women are employed. Good communication appears to be taking place between the PPD and the VCC. Project facilitators from Pakistan visited Vietnam, with exchange of views. Health issues have been studied in rice and will be explored in the impact study.

\(^6\) From the wet season 2002, the duration of the FFS was increased from 12 to 14 weeks
The impact study will not be available until late in the project implementation (probably early 2005). Information being gathered will allow conclusions to be reached about changes in income and pesticide use. The terms of reference for the study call for conclusions related to poverty reduction, environmental indicators, farmers’ health, changes in farmers’ problem-solving and management skills and social skills. However, all questions are related to income and pesticide use, so there are some implicit assumptions built into the study (less pesticides=better environment, better health). Furthermore, there appear to be no plans for any other methods of verification other than the survey, so conclusions about skill levels will be subjective.

**Sustainability at the national level**

Project activities currently contribute to the goal of the VCC to expand cotton production, both in existing areas of cotton production and new areas where farmers need to have exposure to cotton and training in its production. Cotton production currently is subsidized by the VCC at a significant cost to the government. In the future the VCC will be concerned with costs and may opt to use less expensive ways of encouraging farmers to grow cotton (e.g. through manuals and extension field days) rather than continue intensive training of a very large number of farmers. If cotton area were to expand to 150,000 ha, some 240,000 new farmers would have to be trained. Initial training costs in FFSs after four years might be US$25 per such farmer or $6 million. The impact study being conducted by the project, if it were to include cost/benefit elements, could be useful in allowing for informed decision-making on the various options for extension methods in cotton areas. The country and the VCC are committed to IPM (a national IPM policy has been implemented) and IPM methods are likely to continue in any event, whether or not they are imparted through FFS.

The mission was informed that the Vietnam Cotton Company would like to open new areas to dry season cotton production in the Mekong Delta and would like to use FFS as the method of extension to these new farmers. The mission does not feel that the FFS method is appropriate for this, since cotton would be an entirely new crop in the area. FFS is more effective in areas where farmers already have a basic familiarity with the crop in question.
## 9.2 Itinerary

### Group 1 – Visits to Bangladesh, Pakistan and India

<table>
<thead>
<tr>
<th>Date</th>
<th>Activities</th>
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<tbody>
<tr>
<td><strong>October 28</strong>  Monday</td>
<td>Orientation/Meeting</td>
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</table>
| **October 29**  Tuesday | Bangkok – Dhaka  
Briefing with Executive Director, Cotton Development Board and Cotton IPM Country Officer                                                                 |
| **October 30**  Wednesday | Meeting with Secretary of Agriculture  
Meeting with First Secretary, EU Delegation, Mr. Hans Rhein and Senior Engineer, Mr. A. U. Siddiqui  
Dhaka - Jessore  
Jessore - Jhenaidah by car  
Discussions with Composting Field Study Groups  
Discussions with Unnayan Dhara  
Jhenaidah - Jagadishpur by car                                                                 |
| **October 31**  Thursday | Participate in Farmer-to-Farmer FFS, Petvara Village  
Discussion with farmer-facilitators  
Visit to Field Studies by Farmers, Arpara Village  
Visit ToF fields  
Discuss with ToF participants and Expert Facilitators  
Jessore - Dhaka                                                                 |
| **November 1**  Friday | Meeting with Impact Evaluation team and Biodiversity Study Team  
Work in PMU office  
Debriefing with PMU                                                                 |
| **November 2**  Saturday | Dhaka – Karachi                                                                                                                                   |
| **November 3**  Sunday | Karachi – Sukkur  
Visit to Women Open School (AGFUND) Deparja                                                                                                       |
| **November 4**  Monday | Sukkur – Karachi  
Karachi – Islamabad  
Visit PMU                                                                                                                                            |
| **November 5**  Tuesday | Technical Briefing/Presentations                                                                                                                   |
| **November 6**  Wednesday | Briefing with FAOR, Mr. A. M. Aboul-Naga  
Meeting with Chairman, PARC  
Meeting with Director General, NARC and Cotton Commissioner at NARC (National Agricultural Research Centre) |
| **November 7**  Thursday | Concluding discussion/meeting with FAOR  
Islamabad – Lahore  
Lahore – Bangkok                                                                                                                                     |
<p>| <strong>November 8</strong>  Friday | Bangkok-Singapore-Hyderabad                                                                                                                       |</p>
<table>
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<tr>
<th>Date</th>
<th>Activities</th>
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<tbody>
<tr>
<td>November 9</td>
<td><strong>Saturday</strong>&lt;br&gt;Hyderabad&lt;br&gt;Technical briefing: ToF, FFS, Impact assessment&lt;br&gt;Visit to FFS operated by NGO at Sherpalli village, Mehaboob Nagar (85 km from PMU)&lt;br&gt;Interaction with FFS farmers&lt;br&gt;Leave Sherpalli village for Hyderabad&lt;br&gt;Hyderabad - Hubli by train</td>
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<tr>
<td>November 10</td>
<td><strong>Sunday</strong>&lt;br&gt;Group writeup</td>
</tr>
<tr>
<td>November 11</td>
<td><strong>Monday</strong>&lt;br&gt;Departure by road to Garag FFS (all women group)&lt;br&gt;Interaction with Garag FFS participants&lt;br&gt;Departure to Thadakok FFS Village (men-women mixed group farmers)&lt;br&gt;Interaction with Thadakok FFS&lt;br&gt;Departure from Thadakok for Dharwad&lt;br&gt;ToF visit and interaction with ToF participant&lt;br&gt;Departure to Hubli</td>
</tr>
<tr>
<td>November 12</td>
<td><strong>Tuesday</strong>&lt;br&gt;Arrival at Bangalore&lt;br&gt;Departure for Karnataka State Department of Agriculture (KSDA)&lt;br&gt;Meeting with senior officials of KSDA&lt;br&gt;Technical Discussion/Wrap up&lt;br&gt;Bangalore - New Delhi</td>
</tr>
<tr>
<td>November 13</td>
<td><strong>Wednesday</strong>&lt;br&gt;Meetings: Ministry of Agriculture, FAO, EU Delegation</td>
</tr>
<tr>
<td>November 14-18</td>
<td><strong>Meeting</strong>&lt;br&gt;Delhi - Bangkok&lt;br&gt;Consolidation of Mid term review team&lt;br&gt;Preparation for report writing</td>
</tr>
<tr>
<td>November 19</td>
<td><strong>Tuesday</strong>&lt;br&gt;Leave for home</td>
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<tr>
<td>Date</td>
<td>Activities</td>
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<tr>
<td><strong>October 28</strong></td>
<td>Monday Orientation/Meeting</td>
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<tr>
<td><strong>October 29</strong></td>
<td>Tuesday Bangkok - Hanoi</td>
</tr>
<tr>
<td><strong>October 30</strong></td>
<td>Wednesday Programme briefing&lt;br&gt;Role of Liaison Office in Hanoi&lt;br&gt;Meeting with FAOR, PPD, EU Delegation&lt;br&gt;Hanoi – Ho Chi Minh City</td>
</tr>
<tr>
<td><strong>October 31</strong></td>
<td>Thursday Technical briefing by VCC</td>
</tr>
<tr>
<td><strong>November 1</strong></td>
<td>Friday HCMC – Buon Me Thuot City, Dak Lak&lt;br&gt;Visit FFS in Cujut, briefing on impact assessment, University of Agriculture and Forestry&lt;br&gt;Briefing by ToF facilitators and participants&lt;br&gt;Discussions with Programme and VCC staff</td>
</tr>
<tr>
<td><strong>November 2</strong></td>
<td>Saturday Visit FFS facilitated by ToF&lt;br&gt;Dak Lak – Ho Chi Minh City by air</td>
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<tr>
<td><strong>November 3</strong></td>
<td>Sunday Ho Chi Minh City - Manila</td>
</tr>
<tr>
<td><strong>November 4</strong></td>
<td>Monday Visit to FAOR and EU Delegation&lt;br&gt;Technical briefing&lt;br&gt;Meeting with Kasakalikasan, CODA</td>
</tr>
<tr>
<td><strong>November 5</strong></td>
<td>Tuesday Manila - Pangasinan by car</td>
</tr>
<tr>
<td><strong>November 6</strong></td>
<td>Wednesday Pangasinan farmer and facilitator meetings in San Fabian and Urdaneta</td>
</tr>
<tr>
<td><strong>November 7</strong></td>
<td>Thursday Manila - Wuhan</td>
</tr>
<tr>
<td><strong>November 8</strong></td>
<td>Friday Wuhan – Xiantao by car&lt;br&gt;Meet/discuss with farmers/facilitators – Bt cotton study</td>
</tr>
<tr>
<td><strong>November 9</strong></td>
<td>Saturday Xiantao – Wuhan by car&lt;br&gt;Meet with PPS staff</td>
</tr>
<tr>
<td><strong>November 10</strong></td>
<td>Sunday Group writeup</td>
</tr>
<tr>
<td><strong>November 11</strong></td>
<td>Monday Meeting with FAOR, EU Delegation&lt;br&gt;Initial meeting with NATESC on Bt cotton study</td>
</tr>
<tr>
<td><strong>November 12</strong></td>
<td>Tuesday Meeting with NATESC&lt;br&gt;- ToF and FFS&lt;br&gt;- Work plans and general programme matters</td>
</tr>
<tr>
<td><strong>November 13</strong></td>
<td>Wednesday Beijing – Bangkok&lt;br&gt;Group writeup</td>
</tr>
<tr>
<td><strong>November 14-18</strong></td>
<td>Report and presentation</td>
</tr>
<tr>
<td><strong>November 19</strong></td>
<td>Tuesday Leave for home</td>
</tr>
</tbody>
</table>
### 9.3 People Met

#### Group 1

<table>
<thead>
<tr>
<th>Places</th>
<th>People met</th>
</tr>
</thead>
</table>
| FAO Bangkok  | Mr. Peter Ooi, Chief Technical Adviser  
                   Mr. Gerd Walter-Echols, Environmental Impact Analysis Specialist  
                   Mr. Dai Weidong, IPM Liaison Officer  
                   Ms. Doris von Werner, Senior Country Project Officer  
                   Ms. Chanphen Bhwangkananath, Secretary  
                   Ms. Thanomkwan Rachtachart, Accountant  
                   Mr. Shen Chong-Yao, Regional Plant Protection Officer, FAORAP Personnel in FAORAP |
| Bangladesh   | **EU Delegation**  
                   Mr. Hans Rhein, Second Secretary  
                   Mr. Md. Arham U. Siddique, Senior Engineer  
                   **FAO Staff**  
                   Ms. Alma Linda Morales-Abubakar, Cotton IPM Country Officer  
                   Expert Facilitators  
                   Mr. Md. Tofazzal Hossain, Executive Director, Cotton Development Board (outgoing)  
                   Mr. Nazrul Islam, Executive Director, CDB (incoming)  
                   Mr. Rafiqul Haider, Deputy Director, Cotton Development Board  
                   Mr. Abdul Hamid, Professor, Bangabandhu Sheikh Mujibur Rahman Agricultural University  
                   Mr. Talib Bashar Nayan, Director, Unnayan Dhara |
| Pakistan     | **EU Delegation**  
                   Mr. Emmanuel Mersch, First Counsellor Finance  
                   Mr. Mohammad Imran Ashraf, Development Advisor/Agronomist  
                   **FAO Staff**  
                   Ms. Bui Thi Lan, FAO Representative  
                   Mr. A. M. Aboul Naga, FAO Representative  
                   Mr. Manzoor H. Soomro, National IPM Expert  
                   Mr. Itfikhar Ahmad, Deputy Director General, NARC  
                   Mr. Abdul Ghafoor Mangrio, Scientific Officer/Facilitator  
                   Mr. M. Azeem Khan, Agri. Economist/IPM Impact Analysis Expert  
                   Mr. Muhammad Ishaq Mastoi, Facilitator, National IPM Programme  
                   Mr. Allah Warayo Rind, National IPM Facilitator  
                   Ms. Tahira Yasmin, Env. & Health Studies Expert  
                   Mr. Naeem I. Hashmi, Chief Scientist  
                   Mr. Karam Ahad, Ecotoxicology Research Programme  
                   Mr. Yousaf Hayat, Ecotoxicology Research Programme  
                   Mr. Munawar Raza Kazmi, IPM Facilitator  
                   Mr. Qadir Bux Baloch, Cotton Commissioner  
                   Mr. Shahabuddin Siddiqui, Director Plant Protection, Agriculture Extension Sindh  
                   Mr. Kazi Suleman Memon, Director General, Agriculture Research & Extension Sindh  
                   Mr. Mushtaq Hussain Soomro, IPM Facilitator  
                   Mr. Badaruddin Soomro, Chairman, Pakistan Agricultural Research Council |
<table>
<thead>
<tr>
<th>Country</th>
<th>Representatives</th>
</tr>
</thead>
</table>
| India   | Mr. M. Ashraf Poswal, Centre Director, CAB International  
EU Delegation  
Mr. Andrew Headey, First Counsellor  
Ms. Kulan Amin, Adviser  
FAO Staff  
Mr. Daniel Gustafson, FAO Representative  
Ms. Renuka Taimni, Programme Officer  
Mr. Palaniswamy Pachagounder, Cotton IPM Country Officer  
Ms. Francesca Mancini, APO  
Mr. J. B. Venkatakristnan, Administrative Assistant  
Mr. Arun Chandra Ambatipudi, NGO Liaison Assistant  
Ms. Daisy, Secretary  
Mr. S. Balasubramanian, National Expert Facilitator  
Mr. G. R. S. Reddy, National Expert Facilitator  
Mr. V. K. Srivastana, National Expert Facilitator  
Mr. R. Murali, National Expert Facilitator  
Mr. P. D. Sudhakar, Joint Secretary, Government of India  
Mr. A. D. Pawar, Additional Plant Protection Adviser-cum-Director (IPM)  
Mr. S. Subramanya, Commissioner for Agriculture, Bangalore  
Mr. M. S. Raviprakash, Executive Director, AME Foundation  
Mr. J. N. L. Srivastava, Secretary, Ministry of Agriculture |
### Group 2

<table>
<thead>
<tr>
<th>Places</th>
<th>People met</th>
</tr>
</thead>
</table>
| **FAO Bangkok** | Mr. Peter Ooi, Chief Technical Adviser  
Mr. Gerd Walter-Echols, Environmental Impact Analysis Specialist  
Mr. Dai Weidong, IPM Liaison Officer  
Ms. Doris von Werner, Senior Country Project Officer  
Ms. Chanphen Bhawangkananth, Secretary  
Ms. Thanomkwan Rachatchart, Accountant  
Mr. Shen Chong-Yao, Regional Plant Protection Officer, FAORAP Personnel in FAORAP |
| **Vietnam**     | EU Delegation  
Ms. Francesca Aquaro  
Ms Collette Seyler  
Mr. Hoang Thanh  
**FAO Staff**  
Mr. Jean-François Ghyoot, FAO Representative a.i.  
Mr. Cesar Galvan, IPM Training Officer  
Mr. Vu Ngoc Tien  
Mr. Tran Van Hieu, Accounts/Administrative Clerk  
Ms. Nguyen Bich Thuy, Secretary/Database Clerk  
Ms. Ngo Thi Hoang Lam, Programme Assistant  
Ms. Hong Le Diem, Secretary  
Ms. Rikke Petersen, APO  
**Vietnam Cotton Company**  
Mr. Nguyen Huu Binh, Director General  
Mr. Hoang Ngoc Binh, Deputy Director  
Mr. Tran Thanh Hung, Branch Officials in Buon Me Thuot  
MARD Plant Protection Department  
Mr. Ngo Tien Dung, National IPM Coordinator  
Mr. Le Quang Thong and Mr. Tran Minh Tri, Contractors for Impact Study from University of Agriculture and Forestry in Ho Chi Minh City  
Farmers in EaPo, Cumgar  
Facilitators in Cujut |
| **Philippines** | EU Delegation  
Mr. Gildo Pivetta  
**FAO Staff**  
Mr. Arcadio Cruz, National Programme Officer  
Ms. Christine Olarte, Secretary  
Mr. Eugenio Orpia, Jr., CODA Administrator  
Mr. Louis Sese, Deputy Administrator  
Ms. Jeanette Villareal, IPM Coordinator  
Mr. John Chan, Private ginners Isagani Catedral  
Mr. Jesus Binamira, Department of Agriculture National IPM Officer  
Mayor of San Fabian  
Farmers in Barangay Cabaruan, San Fabian, and in Urdaneta  
Facilitators from CODA and LGUs |
| China                                      | NATESC, Ministry of Agriculture                  |
|                                          | Mr. Xia Jingyuan, Director General               |
|                                          | Mr. Chen Shengdou, Deputy Director General       |
|                                          | Mr. Yang Puyun, Deputy Director, Pest Control Division |
|                                          | Ms. Guo Rong, Agronomist                        |
|                                          | Mr. Wu Lifeng                                   |
| EU Delegation                           | Mr. Sven Ernedal                                |
|                                          | Mr. Josef Margraf, Environment and Sustainable Development Section |
| FAO Staff                                | Mr. Gamal M. Ahmed, FAO Representative           |
|                                          | Mr. Sun Yin Hong, Programme Officer             |
|                                          | Mr. Lim Guan Soon, IPM Country Officer          |
|                                          | Mr. Li Shaoshi, National Consultant             |
|                                          | Mr. Wang Yinguan and others, Hubei Department of Agriculture |
|                                          | Mr. Zhang Longguo, Hubei Province Director      |
|                                          | Mr. Shi Shangbai                                |
|                                          | Mr. Chin Ji Xue                                 |
|                                          | Farmers Zhanggou township, Xiantao              |
|                                          | Xiantao City Officials                         |
|                                          | Facilitators Xiantao                           |
|                                          | Ms. Diemuth Pemsl, Hannover University          |
|                                          | Farmer trainers from Lingxian County in Shandong and Mingquan County in Henan |
|                                          | Programme leaders from Shandong, Henan, Sichuan, Anhui |
9.4 Terms of Reference

Integrated Pest Management Programme
for Cotton in Asia (ALA/96/04) (GCP/RAS/164/EC)
Mid-Term Review

I. Background

1. The Programme is being implemented with the explicit development objective of developing a:

“Sustainable, profitable and environmentally sound production of cotton in the participating countries, through the development, promotion, and practice of IPM by farmers and extension staff.”

The immediate objectives of the Programme are as follows:

1.1 To develop a cadre of cotton IPM facilitators from existing extension or field plant protection staff to educate farmers in Farmer Field Schools.

1.2 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 to information from within and outside the Programme area.

1.3 National policies on plant protection re-orientated to support IPM development in the six Programme countries.

2. The Programme was planned to deliver the following outputs:

2.1 Implementation of 20 season-long Training of Facilitators (ToF) to develop a cadre of facilitators.
2.2 Implementation of at least 3,640 IPM Farmer Field Schools (FFS)
2.3 Promotion of demand-driven, farm-oriented field studies involving local research and development agencies in support of extension/training activities in cotton IPM.
2.4 Report on the state of IPM in cotton. The report will contain a global inventory of IPM experiences in cotton and an overview of important field studies and activities.
2.5 Regular exchange of information within the Programme area through the establishment of a comprehensive database, production and distribution of an issue-focused newsletter on cotton IPM, study tours and regional workshops.
2.6 Country reports for each of the participating countries on the status of IPM, including institutions involved, constraints, etc.
2.7 Technical reports on the economic benefits derived from cotton IPM as compared to conventional chemical-intensive methods.
2.8 Support for the development of official national IPM programmes covering cotton in each participating country.

3. The programme on “Integrated Pest Management for Cotton in Asia” was formulated in 1993 and a proposal was finalised in 1995 and submitted to the donor (European Union). In March 1999, the implementing agreement was formally signed between the European Union (EU) and the Food and Agriculture Organisation (FAO).
The project is for a period of five years with funds totalling 12 million Euro. There are six countries, namely Bangladesh, China, India, Pakistan, Philippines and Vietnam, participating in the project. Except for Pakistan, the five countries have been members of the FAO Intercountry Programme for Development of IPM in Rice in South and Southeast Asia. Bangladesh, China, Vietnam and the Philippines were also members of a similar IPM programme focusing on vegetables. Hence, the IPM programme for cotton can draw on the experiences of two other IPM programmes in the region.

4. Following the signing of the Implementation Agreement, the programme was formally initiated on October 17, 1999 with the assignment of the team leader. The Programme Management Unit (PGMU) was established at the FAO Regional Office for Asia and the Pacific in Bangkok. The PGMU co-ordinates activities in each member country through a Project Management Unit (PMU) in each country.

5. In 1998, the total area under cotton was estimated at 33.2 million hectares of which some 51% are located in the six participating countries of the Programme. Together they produce 47% of the world’s total cotton production. The large majority of Asian cotton farmers are smallholders, with farm sizes of less than two hectares. In many places, the farm size could be as small as a quarter hectare.

6. Cotton production in Asia has been associated with inefficient production that relied heavily on chemical control. Indeed, in some countries, smallholders sprayed as many as 30 times per season. It is not surprising that the cost of chemical control input have reached up to 65% of total cost of production. This level of inefficiency has many externalities besides giving a poor economic returns. Excessive use of chemical insecticides also devastate the environment, killing off beneficial insects that often keep insect pests in check. Moreover, the toxic chemicals used often give rise to insecticide resistance that made chemical control unreliable. Due to the development of insecticide resistance, farmers reacted with cocktails of insecticides that exacerbate the situation. This further affects the health of the farmer and the health of the family is often compromised too.

7. The situation in some countries is worse than in others. In India, in the year 2001, large outbreaks of bollworms were reported, probably associated with excessive use of chemical insecticides. This setback was compounded by late rainfall. Extensive media coverage of this situation dates back several years with poignant accounts of severe poverty and inability to pay back loans for chemical insecticides. Such a situation demands remedies that this Programme has demonstrated to be achievable in China, Vietnam and Pakistan. Awareness that chemical insecticides are often more a part of the problem than of the solution is the first step. Educating farmers with skills to find solutions would be more sustainable. Hence, the Programme in its full implementation mode has emphasised on strengthening farmer education, promoting co-operation between various stakeholders and encouraging the set up of national crop protection policies that are more conducive to IPM implementation by farmers.

II. Purpose of the Review

8. The Implementation Agreement between the EU and FAO stipulates that a mid-term review (MTR) must be carried out on the third year of the project (see Annex 2 – Monitoring and Evaluation). The MTR is planned for October/November 2002 as members of the MTR will be able to evaluate cotton production in all six countries.
9. The principal objective of the mid-term review is to provide all stakeholders (e.g. member countries, EC, FAO and the project management) with an independent assessment of the project’s achievements to date. At the mid-point of the project, the evaluation is intended to make recommendations for any necessary changes in the overall design and orientation of the project. The evaluation will also make detailed recommendations on the work-plan for the remainder of the project.

III. Scope of the Evaluation

10. The mission will assess the:

a) Relevance of the project to development priorities and needs.

b) Clarity, and realism of the project’s development and immediate objectives, including specification of targets and identification of beneficiaries and prospects for sustainability.

c) Quality, clarity and adequacy of project design including:

- clarity and logical consistency between inputs, activities, outputs and progress towards achievement of objectives (quality, quantity and time-frame);
- realism and clarity in the specifications of prior obligations and prerequisites (assumptions and risks);
- realism and clarity of external institutional relationships, and in the managerial and institutional framework for implementation and the work plan;
- likely cost-effectiveness of the project design.

d) Efficiency and adequacy of project implementation including:

- availability of funds as compared with budget for both the donor and national component;
- the quality and timeliness of input delivery by both FAO and the Government;
- managerial and work efficiency;
- implementation difficulties;
- adequacy of monitoring and reporting;
- the extent of national support and commitment;
- the quality and quantity of administrative and technical support by FAO

e) Project results, including a full and systematic assessment of outputs produced to date (quantity and quality as compared with workplan and progress towards achieving the immediate objectives). The mission will especially review, the status and quality of work on:

- Bt Cotton Study
- impact evaluation studies
- role of women in cotton production
- support of researchers in cotton IPM
- improvements to both ToF and FFS curriculum
- improved access to IPM information and sharing of information
- health studies

f) The prospects for sustaining the project’s results by the beneficiaries and the host institutions after the termination of the project. The mission should examine in particular:
policy support for IPM implementation at both national and local governments
local funding for IPM activities
farmer to farmer spread of cotton IPM activities
greater awareness of the adverse impact of pesticides on health
legislation of pesticides to reduce risks of health hazards of workers in cotton fields

- The cost-effectiveness of the project.

Based on the above analysis, the mission will draw specific conclusions and make proposals for any necessary further action by Government and/or FAO/EC to ensure sustainable development, including any need for additional assistance and activities of the project prior to its completion. The mission will draw attention to any lessons of general interest. In the event of a need for further assistance, the proposal should include precise specification of objectives and the major suggested outputs and inputs.

IV. Composition of the Mission

11. The mid-term review team will consist of six members as follows:

- Team Leader
- Environment Specialist (approved by EC)
- Agro-Economy Expert
- Representative of the countries participating in the Programme
- Rural Development/WID specialist
- Staff member from FAO Evaluation Service (PBEE)

12. The Team Leader should be internationally recognised in his or her field. The person should have at least 10 years experience in agricultural development and be familiar with programmes and policies of governments and donors in Asia. The other members will have expertise that will cover the fields of IPM including education and extension, rural development, and agricultural production systems.

13. Mission members should be independent and have no direct involvement with the project with regard to its formulation, implementation or backstopping. They should preferably have experience of evaluation.

V. Timetable and Itinerary of the Mission

14. The Review will take place in October-November 2002 with a total duration of 17 days. The indicative programme of the mission will be as follows:

- 2 days Briefings Bangkok plus team discussion
- 11 days Break into two groups for visits to member countries
- 3 days Report writing following incorporation of comments arising from field visits. Reports will be completed in Bangkok
- 1 day De-briefing of entire mission – RAP Bangkok

VI. Consultations

15. The mission will maintain close liaison with the Representatives of the EU Delegation and FAO and the concerned national agencies, as well as with national and international project staff. Although the mission should feel free to discuss with
the authorities concerned anything relevant to its assignment, it is not authorised to make any commitments on behalf of the Government, the EU or FAO.

VII. Reporting

16. The mission is fully responsible for its independent report which may not necessarily reflect the views of the Governments and the EU or the FAO. With some room of flexibility, the report will be written in conformity with the following headings:

a) Executive summary (maximum 2 pages)
b) Introduction
c) Major Findings and Recommendations
d) Background to the Programme
e) Programme Objectives and their relevance
f) Programme design
g) Summary of Programme implementation (including budget and expenditure)
h) Programme results including:
   1) Outputs
   2) Development Process
   3) Programme Effects and their sustainability and impact
   4) Cost effectiveness
i) Lessons Learned
j) Annexes as required, including:

- Country reports (which should concentrate on conclusions and not description)
- Terms of Reference
- Itinerary and main persons met
- List of documents consulted

17. The findings and recommendations will be completed and agreed prior to termination of the mission. The report also will be completed to the maximum extent possible. The mission will also complete the FAO Project Evaluation Questionnaire. The Team Leader bears responsibility for finalisation of the report, which will be submitted to FAO within two weeks of mission completion. FAO will submit the report to Governments and EU together with its comments
9.4 Measuring the Increase in Net Revenues from IPM

Farmer-led experiments have been conducted in Programme countries to measure the impact of following IPM on net revenues. In general these experiments have collected data on partial costs and ascribed the change in net revenues to them. Yield changes have been measured in experimental plots and converted to a per hectare basis; yield has been converted to gross sales by multiplying by price; partial expenses have been tabulated and converted to a per hectare basis; and net revenue (income) calculated by subtracting per hectare partial expenses from per hectare gross sales.

While these measures would seem adequate to demonstrate to the farmers involved the efficacy of using IPM, they may not be adequate for all uses to which the data are put. First, in the budgets examined, labour expended by the farmer is not accounted for fully. To the extent that labour is a free resource (zero opportunity cost), omission of all labour costs may not be serious. However, farmers have indicated the value of reducing the labour in spraying, which is heavy work; similarly, one should not overlook the labour requirement of increased monitoring of fields for both pests and beneficial insects—calendar spraying does of course have the benefit of not expending this effort. Farm households may be interested in the trade-off between labour in spraying, perhaps performed by the male farmer, and labour in field monitoring, perhaps performed by female and child members of the household, in light of the demands upon various household members.

Second, if the data are to be used to measure the gains from IPM in the cotton production sector as a whole or one of its parts, such as a major producing region in a country, or to aggregate these gains on a regional basis in Asia, a more rigorous calculation of the farm budget may be needed. In the Philippines alone, one economic comparison of farmer practice and IPM included expenses for land preparation, planting, fertiliser, spraying, irrigating and harvesting—including labour costs—and another included in expense only the cost of the chemicals applied; economic comparisons in other Philippines experiments, say on plant density, were based on detailed budgets including labour in all operations and even in handpicking of bollworms. Clearly, the measures of net revenues derived are not comparable. It is not possible to aggregate or even average the benefits from IPM over farmer practice with such disparate measures.

It should be noted that in some countries, the detailed reports of the economic gains from IPM show very careful consideration of traditional expenses in all farm operations, such as those in Pakistan and India. Little information on the details of these calculations was provided in China and Vietnam.

It is clear from the results of farmer-led experiments that changes in farm practices other than insecticide use that are a result of farmer empowerment in investigating many ways to improve productivity produce substantial economic gains. To the extent that farmers can improve productivity by reducing insecticide use, by changing seeding rates, by changing plant densities, by using detopping instead of growth regulators and by changes in fertiliser use—all together—may greatly increase the economic gains associated with farmers practicing IPM. In the FFSs supported by this project, farmers are investigating many ways to increase their income.

Finally, while it may be possible to justify the use of IPM methods based on the direct costs and benefits at the farm level, which are of course relatively easy to measure, it is well-recognised that there are externalities to chemical use in agriculture. These externalities have been measured in some countries (e.g. Pakistan health studies) but not in others. A convincing argument to governments to encourage the adoption of policies which may be effective in major reduction in pesticide use, such as the reduction of all pesticide use by 50%, probably depends on some sort of quantification of these externalities.

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