



**Food and Agriculture Organization  
of the United Nations**



**FAO-EUIPM Programme  
for Cotton in Asia**

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**ENVIRONMENTAL  
EDUCATION FOR  
POOR FARMERS**





FAO-EU IPM Programme for Cotton in Asia



ENVIRONMENTAL EDUCATION FOR POOR FARMERS

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## ACKNOWLEDGEMENTS



This programme completion report for the public acknowledges the close partnership between the Commission of the European Communities (EC) and the Food and Agriculture Organization (FAO) of the United Nations in addressing the issues of poverty alleviation, sustainable agricultural and rural development, environment protection, trade, good governance, human health and education and most of all hopes for the poor through quality farmer education. Both EC and FAO are grateful to the national and state/provincial governments who have supported this initiative and continue to believe in this approach by following up with local funding to sustain the achievements made in their respective countries. The Programme is grateful to the national field staff from governments and NGOs who took up the challenge of educating farmers. To the national and international consultants (especially from European universities and institutions) our grateful thanks for sharing their experience and expertise. Thanks are due to FAO staff in headquarters, regional and country offices for helping in implementing this Programme. To the Italian and Danish Governments, our thanks for supporting the Associate Professional Officer schemes of the FAO that saw two of their nationals working in India and Vietnam, respectively. The Programme had the privilege of hosting two M.Sc. students from Wageningen University, Netherlands in the field site in Vietnam and the synergy of student research and farmer education helped enrich the farmer field research programme.

The publication of this book is a testimony to the thousands of resource-poor farmers who benefited from the Farmer Field School (FFS) approach as reflected in the faces of IPM from the six countries.





## EUROPEAN COMMISSION

EuropeAid Co-operation Office

Asia

**The Director**

In seeking to address the challenges and the opportunities offered by globalisation and to strengthen joint efforts on global environmental and security issues, the EC has identified a number of core development priorities which underline EC-Asian Co-operation. These policies are set down in the 2001 Commission Communication “Europe and Asia: A Strategic Framework for Enhanced Partnerships” and include: Peace and security in Asia; the development of the less prosperous countries of the region, the strengthening of mutual trade and investment flows and the creation of global partnerships and alliances with Asian countries.

In March 1999, the European Commission and the FAO (as the implementing agency) signed a Financing Agreement (ASI/B7-3000/IB/96/150) of an amount of EUR 12 Million for the implementation of the five year programme entitled: “*Integrated Pest Management for Cotton in Asia*”. Through the successful implementation of the programme, which ends in December 2004, the EC has taken one step further to achieving its objectives.

The EU funded the “*IPM Programme for Cotton in Asia*” in response to the needs of cotton producing countries to tackle rising production costs, increasing pollution of the environment due to excessive pesticide use, the deteriorating health of farmers and the increase in poverty. Under these conditions, cotton producers face increasing challenges in a globalised market. The IPM Programme for Cotton in Asia is promoting more ecological production methods in Asia, where over 50% of the world’s cotton plantations are. This Programme has shown that farmer education through the Farmer Field School (FFS) approach is key to encouraging more sustainable agricultural production, which is profitable to small-scale producers and acceptable to local and international traders.

The European Commission is pleased to be associated with the FAO in bringing about the benefits of farmer education to small-scale farmers. The Farmer Field School education has helped to empower the farmers working for most of them under rainfed conditions to be more efficient. In this respect, the EU is engaged with FAO in achieving common objectives in reducing poverty in the less prosperous countries through the promotion of sustainable agricultural development. The EU-FAO initiative is supporting the efforts towards peace and security as well as a stable and democratic political environment in participating countries.



**Erich W. MULLER**  
Director





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**F**AO is committed to the realization of the Millennium Development Goals (MDGs) set during the Millennium Summit in the year 2000, and its current programme encompasses most of these goals. They include, among others, actions to eradicate poverty and hunger, ensure environmental sustainability and develop a global partnership for development. With more than two thirds of the world's poor and over 500 million people living in hunger in the Asia and the Pacific region, the Organization, along with the member states, faces tremendous challenges in meeting the MDG of reducing hunger and poverty by half by the year 2015. To strengthen its contributions for achieving the MDGs and for responding more effectively to the needs in the region, the FAO Regional Office for Asia and the Pacific has adopted a regional strategy that includes priorities such as agricultural sector restructuring, decentralized governance and empowerment, effective and equitable management, conservation and sustainable use of natural resources, reduced vulnerability to natural disasters and strengthened biosecurity.

The FAO-EU IPM Programme for Cotton in Asia fits well into this regional strategy; it has shown that farmer field schools are an effective method of empowering and mobilising farm families and of developing the enhanced management skills necessary for a sustainable pro-poor and environmentally-friendly agricultural and rural development. The experiences gained from this Programme will benefit many ongoing and future endeavours to reduce poverty and conserve precious natural resources. The FAO Regional Office in Bangkok is proud to have been associated with this Programme. I am pleased to take this opportunity to express my most sincere appreciation to the European Commission for having provided the financial resources, to FAO staff in the headquarters, the regional office and the field, and to our cooperation partners in the participating countries who all have contributed to the Programme's success and significant impact.

**He Changchui**

*Assistant Director-General and*

*FAO Regional Representative for Asia and the Pacific*



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The FAO-EU IPM Programme on Cotton in Asia demonstrates again that IPM is more than pest management and offers an entry point to improve the farming system as a whole. It provides ecological sustainability, as it protects the environment; it improves social stability, as it is institutionalized at local level; it helps the poor, as it reduces farmers' dependence on procured inputs and lessens their vulnerability. In combination with farmer field schools, IPM is an effective instrument to link poverty reduction and environmental management.

The FAO-EU Programme has addressed a major source of pesticide misuse and overuse in Asia. It has established the large potential for pesticide reduction and the socio-economic benefits that can come from it. I would like to thank the European Commission for entrusting FAO with the implementation of this regional project that has achieved important outcomes in terms of economics, environment including agro-biodiversity, and human and animal health and has shown the potential to improve the livelihoods of millions of poor farmers.

**Niek van der Graaff**  
*Chief, Plant Protection Service  
Food and Agricultural Organization  
of the United Nations*



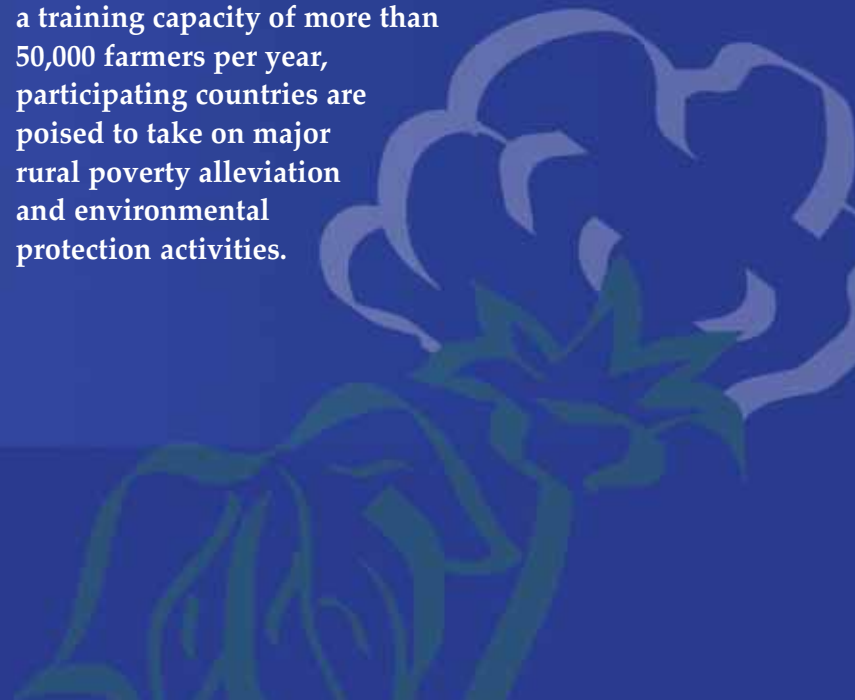
# COTTON IN ASIA: CASH FOR THE POOR

**M**ore than half of the world's cotton is produced by Asian farmers, the majority of them small landholders with plot sizes of less than one-half hectare. Within Asia, cotton production is diverse and this diversity manifests itself among the countries participating in the FAO-EU Integrated Pest Management (IPM) Programme for Cotton in Asia. Three of the Programme countries are major contributors to the total world cotton harvest: China producing 20 percent, India 14 percent and Pakistan 10 percent. The other three member countries are very minor participants, each representing less than one-tenth of one percent of world production. Since project initiation in 1999 there have been considerable fluctuations in world production, consumption and prices. With consumption outpacing production, international cotton prices rose 24 percent in 2003-04, the highest in six years.

All member countries have important cotton-processing and textile industries employing millions of low-salary factory workers, many of

them women. However, more cotton is consumed in these industries than is produced in the countries; thus, valuable foreign exchange is spent on imports. Given the importance of cotton in their national economies, the Cotton IPM Programme was very relevant in terms of trade, reducing environmental contamination from heavy pesticide use, improving health of farming communities, promoting complex and autonomous management skills, and meeting requirements of WTO regimes that come into force in 2005.

The FAO-EU Programme was implemented to contribute to rural poverty alleviation and to protect agro-biodiversity through an ecosystem-based production and pest management approach. After establishing a training capacity of more than 50,000 farmers per year, participating countries are poised to take on major rural poverty alleviation and environmental protection activities.





## RURAL POVERTY AND COTTON

**F**AO-EU Programme member countries produce 45% of the world's cotton, but employ more than 70% of its cotton growers, many of them living in poverty. Despite rapidly developing economies, three-quarters of the world's poor still live in Asia. For more than 20 million small-scale farmers there, cotton is the only crop that gives them extra cash for family expenses. For example, in Pakistan 70-80% of the programme's farmers live below the poverty line. For this reason, cotton production is actively promoted as an important part of the rural development strategy in most member countries. However, cotton also has its drawbacks, as it is by far the largest user of pesticides, adding health problems to poverty and deteriorating environmental conditions.

Cotton production involves the whole family, and women play an important role. They not only supply up to 70% of the labour inputs, they also contribute to many crop and pest management decisions and allocation of scarce family resources, even in male dominated societies. When husbands look for work elsewhere, women find themselves in charge of all crop management decisions. Though not specified in the original project document as main beneficiaries, the Programme focused its attention on strengthening the management capacities of small-scale farmers and women. It continuously monitored whether farmer education activities reached the right group of beneficiaries. According to the impact assessment sample, the number of participants living below one dollar per day averaged from 47% to 92% for the different countries. Women participation steadily increased over the years.



### Rural Poverty Levels in Member Countries

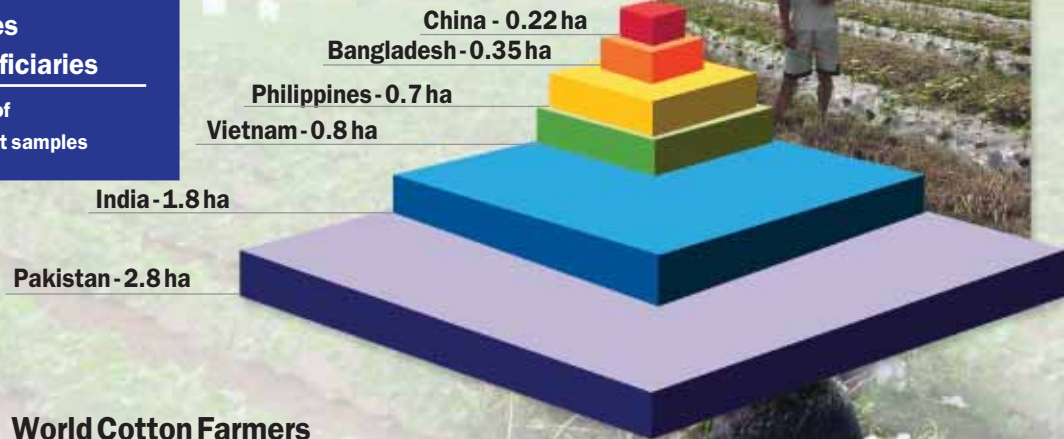
Country	National Poverty Line	International Poverty Line	Year of survey
	% rural population below	% below \$1/day	
<b>BANGLADESH</b>	<b>53.0</b>	<b>36.0</b>	<b>2000</b>
<b>CHINA</b>	<b>4.6</b>	<b>16.6</b>	<b>1998/01</b>
<b>INDIA</b>	<b>30.2</b>	<b>34.7</b>	<b>2000</b>
<b>PAKISTAN</b>	<b>35.9</b>	<b>13.4</b>	<b>1998</b>
<b>PHILIPPINES</b>	<b>50.7</b>	<b>14.6</b>	<b>1997/00</b>
<b>VIETNAM</b>	<b>57.2</b>	<b>17.7</b>	<b>1993/97</b>

Source: World Development Indicators, World Bank 2004



## Cotton Plot Sizes of Project Beneficiaries

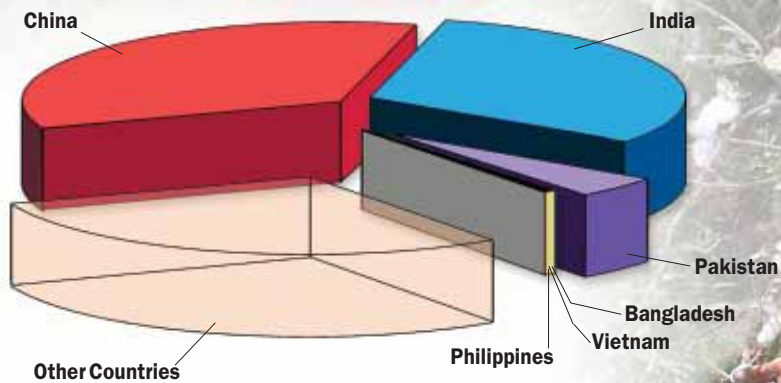
Country averages of impact assessment samples



## World Cotton Farmers

Estimated Total: ~29 million

FAO-EU Programme Member Countries: ~20 million (70%)





## PESTICIDES AND COTTON

**M**ore pesticides are used on cotton than on any other crop. For example, in India and Pakistan, in excess of 50% of all pesticides in these countries are applied to cotton. In many areas, cotton is sprayed 15-20 times during the season. Overall, an estimated 30% of all pesticides used in Asia are applied to cotton, representing a value of US\$ 1.5 billion every year. Considering that integrated pest management experience has shown that more than half these applications are unnecessary, substantial savings of US\$ 500-1,000 million annually are possible.

Insecticides currently represent 15-25% of the cotton production cost in China, India, Pakistan and Philippines, if labour costs are included.



Looking at small farmers' actual financial outlay, the percentage is even higher.

Over the past decade, rising insecticide costs have lowered the returns on growing cotton and resulted in declining cotton areas, especially in the Yangtze and Yellow River basins of China, in India and in the Philippines. Excessive pesticide use has been associated with build-up of pest resistance, decline in populations of natural enemies, degradation of the environment, and serious health problems among those spraying and picking cotton.

Many pesticides used in cotton belong to the highly toxic WHO Class I group of chemicals. Detoxifying pest control strategies and replacing them with a more sustainable and environmentally friendly cotton production system was a major objective of the FAO-EU Programme.



**Annual Pesticide Usage in Asia  
without Japan, Near East and CIS  
400,000 ton a.i.\*; US\$ 5,600,000,000**



FAO-EU IPM Programme for Cotton in Asia

\* a.i. = active ingredient



**Indian farmers fall prey to deadly pesticides**



**BANGALORE, Wed.** — Long-term exposure to pesticides has killed more than 300 cotton farmers in the southern Indian city of Warangal and more are falling prey to the chemicals, activists claim.

Four Indian non-governmental organisations, which formed part of a fact-finding team to investigate the deaths, in a report said vast amounts of chemicals were used in Warangal district of Andhra Pradesh State

during the sowing season from June to September, last year.

"When the team consisting of doctors, lawyers and activists went into the villages in September, last year there were only eight deaths reported," said Narasimha Reddy, chief of Centre for Resource Education, a non-governmental body.

"After elaborate discussions, we found that more than 500 people had died due to exposure to the pesticides

in the whole of Warangal district in September," Reddy said.

The organisations unveiled their report in Bangalore over the weekend at a meeting of several non-governmental bodies concerned to discuss the harmful effects of pesticides.

The Warangal farmers used both conventional and novel spray devices — both, experts he said. — AP





## ENVIRONMENTAL, HEALTH AND TRADE PROBLEMS INTENSIFY POVERTY

**P**roblems associated with heavy pesticide use are widely recognised and include health effects on applicators, field workers and consumers. Detrimental effects on agro-biodiversity and ecological functions such as natural pest suppression, soil fertility and pollination have also been observed. Ground water contamination with pesticides and percolating into drinking water resources is widespread. Recent reports about contaminated soft drinks and bottled water in India highlighted the environmental and health hazards associated with excessive use of insecticides in cotton.

Phytosanitary standards, pesticide residues and environmentally and socially unacceptable cultivation practices are increasingly used as barriers to international trade, and consumers in importing

countries are rejecting questionable products. Instead of investing in expensive pesticide residue laboratories and testing, IPM aims to address the problem at the source and produce low-pesticide healthy crops in an environmentally friendly and socially acceptable manner. In this way, an uninterrupted access to local and foreign markets can be secured.

Farmers who have observed and understood ecological interactions through self-discovery exercises during farmer field schools become highly motivated protectors of natural enemies in their fields. They avoid using pesticides out of conviction, not because they are told to. IPM significantly increases the biodiversity in agricultural fields by conserving natural enemies and maintaining a sound ecological balance.



Farmer field schools empower farmers to create a safer working environment for themselves and their families. By becoming aware of negative health effects and ways to reduce pesticide applications, farmers can live without the fear of being poisoned, endangering their families and communities, and consuming contaminated farm products.







# PROJECT DESIGN, STRATEGY AND OBJECTIVES



**T**he Programme formulation was carried out in June 1993 and six years elapsed before the Implementing Agreement between FAO and the EC was signed by the EC and FAO in February/March 1999. The project officially started on 17 October 1999 with the arrival of the first team leader. Much had changed in the six years since the project document was originally formulated. This made it necessary to reassess assumptions and strategies and revise workplans, outputs and schedules. EC supported flexible Programme planning and adjustment which was a decisive factor for staff enthusiasm and innovation during implementation.

<b>Project Title</b>	<b>: FAO-EU IPM Programme for Cotton in Asia</b>
<b>Scope</b>	<b>: Bangladesh, China, India, Pakistan, Philippines and Vietnam</b>
<b>EC Project No.</b>	<b>: ALA 96/04</b>
<b>Agreement No.</b>	<b>: ASI/B7-3000/IB/96/150</b> <b>(signed 19 February 1999 by EC and 15 March 1999 by FAO)</b>
<b>FAO Project No.:</b>	<b>GCP/RAS/164/EC</b>
<b>Duration</b>	<b>: 5 years (17 October 1999 to 16 October 2004)</b>
<b>Budget</b>	<b>: ECU 12,000,000 (US\$ 12.4 million)</b>

## PROJECT DESIGN: COTTON-FIRST TO PEOPLE-FIRST



**T**he development objective in the Programme document focused only on cotton production, i.e. *“sustainable, profitable and environmentally sound production of cotton in the participating countries, through the development and practice of IPM by farmers and extension staff.”*

In the years between project formulation and actual implementation, farmer field schools emerged as the key ingredient of successful IPM and a powerful instrument of farmer capacity building. Therefore, farmer empowerment and informed decision-making also became key goals for the FAO-EU Programme, yet this was not reflected in the stated development objective of the Programme. Therefore, the mid-term evaluation suggested a more appropriate development objective: *“Farmers in a cotton-based production system, through observation and experimentation, are empowered to solve pest and other production problems in their own fields.”* This development objective effectively shifted the emphasis from cotton production to human resource development and more accurately reflected what the Programme was actually trying to achieve in the field.

The original ‘cotton production’ objective, however, influenced the choice of partners in some of the Programme countries. In the three countries where cotton was only a minor national crop, the partner was the national cotton production company, for which farmer empowerment was a secondary objective to increased cotton production. All countries except for Pakistan had previous IPM projects on rice and/or vegetables, and had already trained field school facilitators.

The Programme was financed for five years and involved building training capacity and an operational framework. This would naturally lead to a deployment of facilitators and the building of both effective institutional structures and sustainable farmer groups.





## Programme Objective

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

Immediate Objectives	Targets*	Follow-up Activities
1. To develop a cadre of IPM facilitators from existing extension or field plant protection staff to educate farmers in farmer field schools	<ul style="list-style-type: none"> <li><input type="checkbox"/> 21 ToF courses and more than 1,000 IPM facilitators</li> <li><input type="checkbox"/> capacity to educate 50,000 farmers per year</li> <li><input type="checkbox"/> at least 3,829 FFS and 90,000 farmers trained</li> <li><input type="checkbox"/> focus on skills to organise FFS</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> build sustainable management systems to utilise full training capacity</li> <li><input type="checkbox"/> focus on poverty alleviation potential of IPM-FFS</li> <li><input type="checkbox"/> focus on cropping system management</li> <li><input type="checkbox"/> reach critical mass of farmers for local reinforcement and farmer-to-farmer spread to new areas</li> </ul>
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.	<ul style="list-style-type: none"> <li><input type="checkbox"/> increased number of contacts, exchanges and agreements between organisations concerned with IPM and cotton production in Asia</li> <li><input type="checkbox"/> production of newsletters, electronic website and technical reports</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> build sustainable FFS farmer alumni groups and farmer self-help organisations</li> <li><input type="checkbox"/> build local, provincial and national umbrella organisations for farmer mobilisation and empowerment</li> <li><input type="checkbox"/> promote farmer field research for adaptation of new technologies and knowledge generation</li> </ul>
3. National policies on plant protection in cotton re-oriented to support IPM development in the six Programme countries.	<ul style="list-style-type: none"> <li><input type="checkbox"/> results of training programmes and impact studies will be widely available</li> <li><input type="checkbox"/> IPM policies for cotton will have been reviewed,</li> <li><input type="checkbox"/> evidence of policy change will come in the form of policy statements, sector plans and programme documents prepared by national governments</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> use impact study evidence for policy dialogue to conserve agro-biodiversity and reduce poverty</li> <li><input type="checkbox"/> redirect extension policies to focus on rural adult education and self-help capacity for male and female farmer groups</li> <li><input type="checkbox"/> institutionalise quality and impact monitoring to build effective learning organisations</li> </ul>



\* based on the revised targets in the *Inception Report of 2000*

## STRATEGY: QUALITY FARMER EDUCATION FOR EMPOWERMENT

In order to achieve the Programme objectives, country projects concentrated their efforts on developing training capacity to educate cotton farmers about the agro-ecosystem and about how to verify and further develop environmentally friendly pest control strategies. The biggest challenge the project faced was how to bring high quality education efficiently to large numbers of farmers, each one with only a small plot of cotton.

Like any skill, the new pest and production management skills needed to be repeatedly practiced by farmers under the guidance of an expert facilitator until they were mastered independently. In the Cotton IPM Programme, skills training took place in weekly, season-long practical sessions called Farmer Field Schools (FFS). To achieve and maintain a high quality farmer education, extension agents and fellow farmers were extensively trained in season-long Training of Facilitator (ToF) courses.

The originally targeted number of 21 ToF and 1,000 facilitators was found to be too low to achieve a sustainable training capacity of more than 50,000 farmers per year. Therefore, additional courses had to be scheduled for both government extension agents and farmer facilitators.

Farmer field schools and integrated pest management are a powerful combination of strategies for farmers growing diverse crops such as rice, vegetables or cotton to achieve comprehensive sustainable development. This approach has been particularly successful with small-scale farmers searching for a way out of the vicious cycle of increasing costs and reduced profits. Such cycles have occurred where ecological processes in the fields have been disrupted by the excessive use of pesticides and other agricultural inputs.

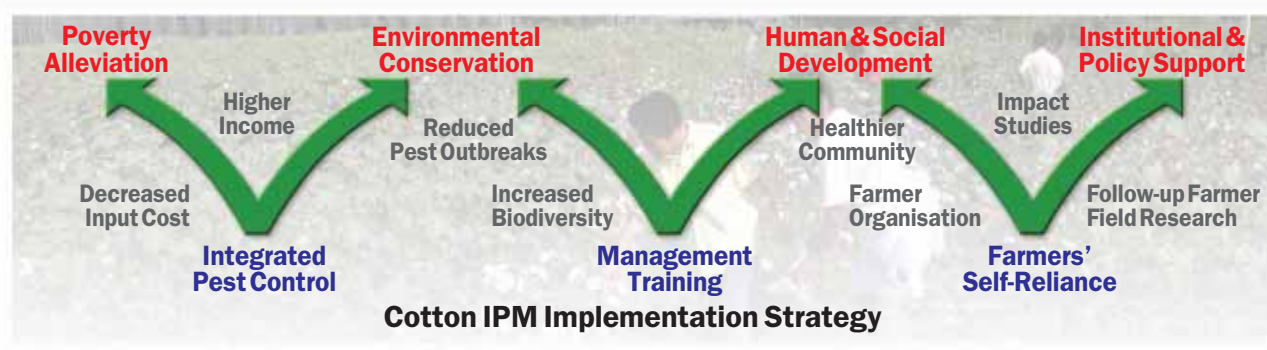


## Mission Statement:

*The Programme aims to improve inefficient small-scale cotton-based production systems in Asia and develops, implements and evaluates sustainable farmer education programmes in member countries. We care for the agricultural environment and serve the people who have to live from it. Through our activities we seek to improve the livelihoods of small-scale farm families, thus helping to alleviate poverty and health risks while protecting the environment. We believe that this can be best achieved by nurturing farm families' capacities to manage their field ecologies in a self-reliant manner, to generate and evaluate new knowledge and technologies, and work together cooperatively with other farmer families.*

Farmer field schools are also suitable for educating farmers in the complex management skills necessary for a modern, market-oriented economy. Therefore, farmer education is a trans-sectoral field that addresses a number of development issues:

- ❑ Poverty alleviation and sustainable livelihoods
- ❑ Protection of the environment and natural resources
- ❑ Food safety, safe trade and international treaties
- ❑ Health and safety at work
- ❑ Good governance, self-reliance and efficiency of state institutions
- ❑ Education and gender equality



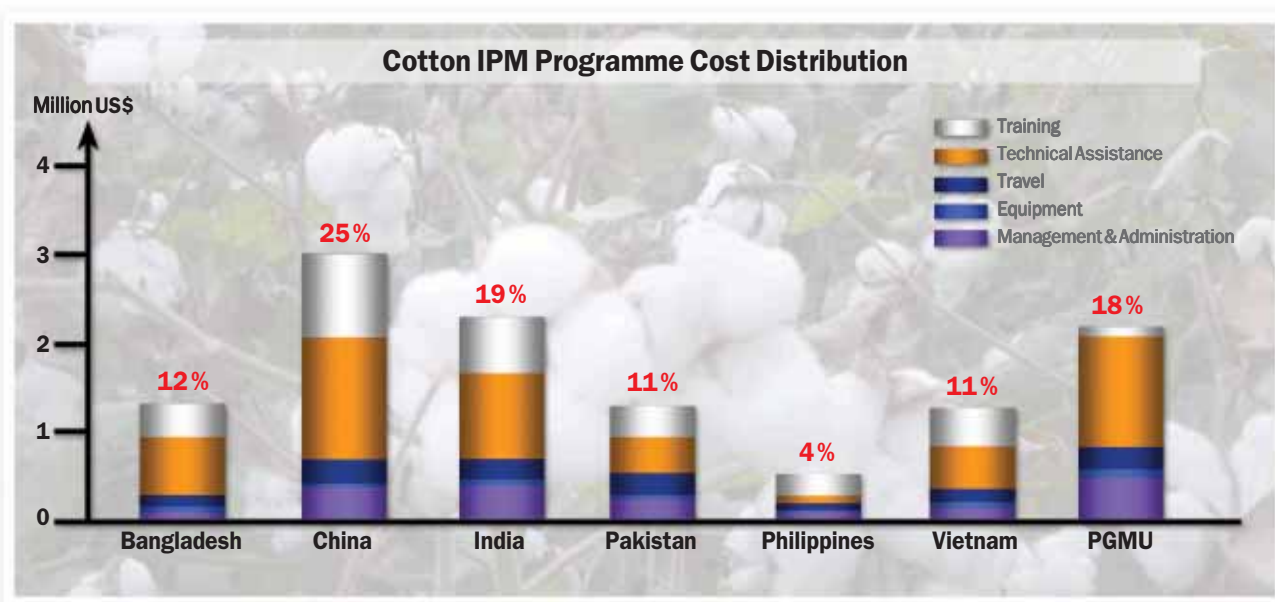


## PROGRAMME IMPLEMENTATION: INNOVATION AND NATIONAL OWNERSHIP

The Programme started in October 1999 with a one-year inception phase. The Inception Report of June 2000 set the output targets for the Programme as a whole. In consultations between FAO and EC it was decided at that time to have additional country IPM officers and to investigate the effect of genetically modified Bt cotton in China. Since these new activities had not been included in the original budget of Euro 12 million, an additional \$ 2 million was requested. This planning flexibility for adding quality and addressing critical new areas was a factor for enthusiasm and innovation during Programme implementation.

The Programme became fully operational in 2001. Project Management Units were established

in each participating country, and these were coordinated by the Programme Management Unit located at the FAO Regional Office for Asia and the Pacific in Bangkok, Thailand. From 2001 onward, annual work plans were prepared and routinely monitored. A quarter of all funds were spent in China, followed by India with 19% and Bangladesh, Pakistan and Vietnam with 11-12% each. Only 4% were invested in the Philippines. Comparatively little was spent in Pakistan relative to the number of cotton farmers because the Asian Development Bank and the Arab Gulf Fund funded two complementary cotton IPM projects. The projects were implemented as one under the National IPM Programme.



The mid-term review mission recommended expanding the successful Programme to more countries and other crops. The EC concluded that the Programme with its objectives did *“not correspond to the strategic priorities outlined in the EC Strategy Paper and Indicative Programme for Multi-Country Programmes in Asia 2005-2006”*. As a result, participating countries were challenged to provide their own funding in order to implement farmer field schools with the trained facilitators in 2004.

The final review mission in 2004 concluded that the Programme had a significant impact in participating countries. However, it also recognised the critical need for continued technical assistance for a successful realisation of the follow-up programme expansion plans of India and Pakistan.

### Farmer Field Schools Implementation 2000-2004







# PROJECT ACTIVITIES

**T**he central ingredient in the FAO-EU IPM Programme for Cotton in Asia was the farmer field school (FFS), which had already demonstrated its rural development potential in rice and vegetables cultivation systems in Asia. Like in other crops, educating farmers on IPM in cotton involved FFS on an ecology-based pest control approach that sought to maximise economic benefits to farmers while protecting health and the environment.

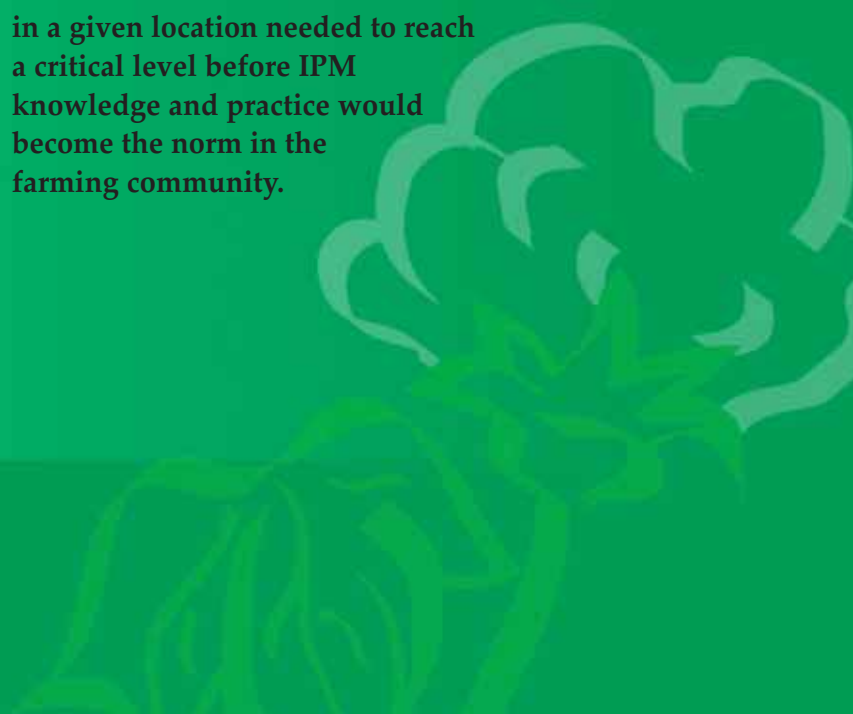
The four principles of IPM are

1. Grow a healthy crop;
2. Base decisions on understanding the field agro-ecosystem, including the role of natural enemies;
3. Regular and careful observation of the field;
4. Farmers are experts.

An FFS in IPM involves facilitated season-long experiential learning by farmers in village groups. Through the FFS, farmers become IPM

experts and pest managers of their own crops. The FFS approach differs from conventional extension programmes insofar as it does not pass on instructions to farmers, but aims to raise their educational level through experiential learning and the enhancement of human and social skills.

In the FAO-EU Programme, FFS facilitators learned their skills in season-long *Training of Facilitators* courses. The participants were usually recruited from extension services, but also included NGO staff and experienced farmers. Continued training of new facilitators was expected to have a compounding effect over several years to allow for an expansion and intensification of the Programme. It was theorised that the number of trained farmers in a given location needed to reach a critical level before IPM knowledge and practice would become the norm in the farming community.

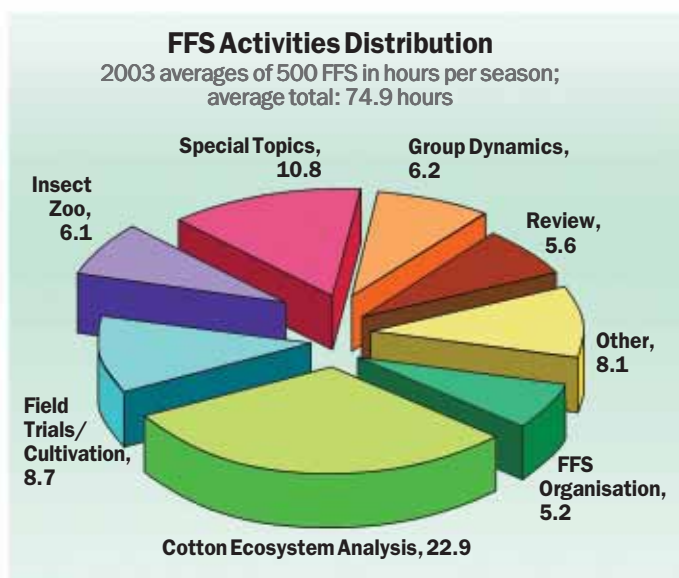


# FARMER FIELD SCHOOLS FOR EMPOWERMENT



The farmer field school (FFS) was the primary learning approach used to educate farmers about IPM through a season-long learning experience. FFS are schools without walls, organised in the fields of participating farmers. About 25-30 participants meet in the morning for a half day each week for one entire season, from the pre-planting period until after the harvest. At each FFS meeting, the members break 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. Observations are recorded, discussed, and interpreted by the group with assistance from the FFS facilitator. This analytical process, which is usually carried out by comparing drawings of what was observed, is called "cotton ecosystem analysis".

FFS participants evaluate the balance among the observed pests and their natural enemies and then decide collectively on the field management practices for the coming week. The whole concept of FFS is to help farmers become better decision makers, and the approach encourages self-motivated discovery learning.





FFS farmers carry out additional field experiments, such as defoliation studies to learn about plant-physiological compensation after damage. They set up “insect zoos” to study predation and parasitism. Special topics also studied in the FFS include the effects of pesticides on natural enemies and on human health, as well as improvement and maintenance of soil fertility. Group dynamics activities aim to build stronger farmer cohesion, trust and cooperation.

FFS curricula are usually decided in a joint effort involving farmer participants, FFS facilitators and consultant researchers, who collaborate on both the content and the set-up of field experiments.

**Total FFS and Graduates in the Programme Countries 2000-2004**

Country	Total		FAO-EU Programme		Government/ Others	
	No.	Graduates	No.	Graduates	No.	Graduates
<b>BANGLADESH</b>	148	3,700	148	3,700	-	-
<b>CHINA</b>	1,061	29,654	661	18,125	400	11,529
<b>INDIA</b>	1,456	35,828	487	11,787	969	24,041
<b>PAKISTAN</b>	525	12,999	352	8,685	173	4,314
<b>PHILIPPINES</b>	43	920	38	813	5	107
<b>VIETNAM</b>	428	10,615	428	10,615	-	-
<b>TOTAL PROGRAMME</b>	<b>3,661</b>	<b>93,716</b>	<b>2,114</b>	<b>53,725</b>	<b>1,547</b>	<b>39,991</b>

In the course of the FAO-EU Programme, a total of 3,661 FFS were organised, educating nearly 94,000 farmers. Sixty-one percent of these were financed from EU funds. The Programme succeeded in building a training capacity of more than 50,000 farmers per year. With the help from National and State/Provincial Governments and other donors, two-thirds of the available facilitators conducted FFS in 2004, reaching more than 30,000 farmers in China, India and Pakistan.





# FARMER-TO-FARMER FIELD SCHOOLS FOR SUSTAINABILITY



**F**armer-to-farmer field schools (F2FS) involved skilled farmer-facilitators training other farmers in an FFS, allowing enthusiastic FFS graduates to share their new skills and experience with fellow farmers. It was demonstrated to be a major component of sustainable IPM practice. In the Programme member countries, such field schools were first implemented

in Vietnam in 2000 and 2001. This was followed by China and Bangladesh in 2002 and India and Pakistan in 2003. Farmer-to-farmer field schools complemented the regular FFS by government facilitators, established ownership among farmers and thereby contributed to the long-term development and sustainability of IPM.

Farmer-facilitators were selected from among farmer field school graduates. Before conducting their own farmer field schools, they attended a farmer ToF (FToF) course. At the FAO-EU Programme, more than 12,000 farmers were educated by fellow farmers. Especially in India, China and Pakistan, farmer-to-farmer education has become an important vehicle for IPM expansion.





**F2FS and Graduates in the Programme Countries 2000-2004\***

Country	Total		FAO-EU Programme		Government/ Others	
	No.	Graduates	No.	Graduates	No.	Graduates
<b>BANGLADESH</b>	33	825	33	825	-	-
<b>CHINA</b>	132	2,878	102	2,016	30	862
<b>INDIA</b>	208	5,146	33	791	175	4,355
<b>PAKISTAN</b>	134	2,985	61	1,160	73	1,825
<b>PHILIPPINES</b>	-	-	-	-	-	-
<b>VIETNAM</b>	36	851	36	851	-	-
<b>TOTAL PROGRAMME</b>	<b>543</b>	<b>12,685</b>	<b>265</b>	<b>5,643</b>	<b>278</b>	<b>7,042</b>

\* These numbers are included in the previous "Total FFS" Table

Farmers as facilitators have as advantages their extensive farming experience and that they “think like farmers”. However, the cost benefit of using farmer-facilitators needs further investigation, since their operational range and availability is more limited than that of government staff. In the long run, the major role of farmer-facilitators may be as alumni group leaders for follow-up knowledge-generation and social mobilisation activities, rather than as facilitators of new FFS.





## FFS ALUMNI GROUPS FOR SOCIAL MOBILISATION



Though they were not part of the original project design, increased attention was given to the sustainability of FFS alumni groups. It was stressed that an FFS starts with the graduation ceremony; it does not end with it. Consequently, FFS became an important entry point to a wide range of multi-disciplinary farmer field research and social mobilisation activities.

Post-FFS activities can be divided into farmer-to-farmer education; cotton production related field trials; IPM initiatives on other crops; income generation; and social/community activities.

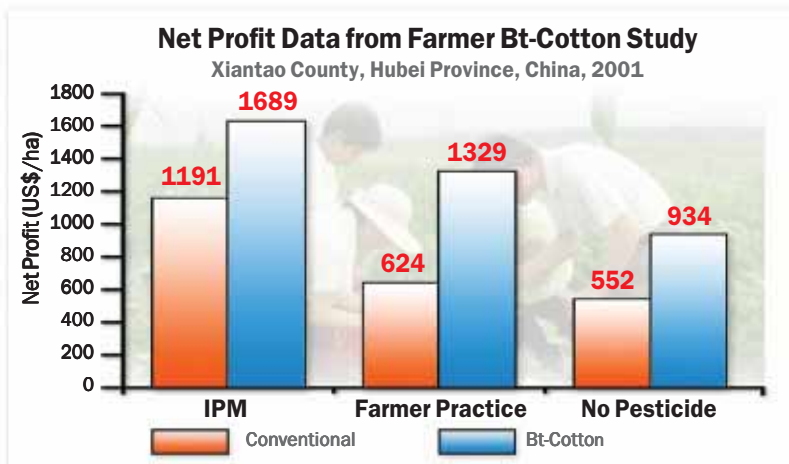
Most country projects actively supported farmer research through the *Participatory Technology Development* approach. Farmers decided on the issues to be studied, many of which stemmed from topics raised during FFS sessions. Examples of such research were: conservation

and improvement of soil fertility through the use of compost and nitrogen-fixing crops; efficient use of fertilisers; the testing of cotton varieties; evaluating Bt cotton in Shandong and Hubei provinces of China, experimentation with spacing and planting densities; the use of trap crops to reduce pest damage; the timing and dosage of pesticide applications; and the use of 'organic' pesticides such as neem-tree extracts, nucleopolyhedrosis virus (NPV) solutions, garlic and chilli mixtures, soap, etc. In Pakistan, additional training in field experimentation was offered to prepare farmers for a more scientific approach.

Many FFS alumni groups also applied the IPM principles to other crops. For example, female participants in Bangladesh considered their participation in cotton IPM useful since they could apply the principles learned to vegetables.

Many farmer clubs generated income through membership fees, communal cotton production, production and sale of neem-tree based pesticides,





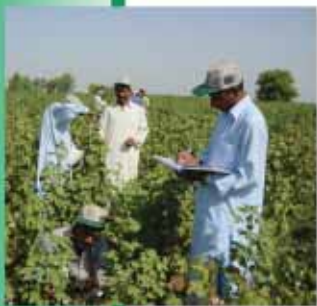
artificially reared natural enemies (*Trichogramma*) or vermi-compost. In Bangladesh, one group started a communal dairy farm and another group gave credit to members to allow them to postpone their sale of cotton until a time when prices were higher.

Some alumni clubs embarked on social-cultural activities for the benefit of the village. In India, mass-marriages were arranged for poor villagers who could not afford the costs involved in a wedding; in Bangladesh, literacy classes were organised; in Pakistan, communities built bridges over irrigation canals and set up clinics, and women alumni organised sewing and vegetable seed production activities for extra income.





# TRAINING OF FACILITATORS FOR INSTITUTIONAL CAPACITY BUILDING



**T**raining of Facilitators (ToF) is a field-based, season-long residential learning experience involving up to 30 future facilitators at a time. During the course, participants improve their technical expertise in IPM; develop participatory, non-formal adult education training skills; and enhance their management and experimental capabilities. The curriculum consisted of ecosystem analysis; crop development and management; decision-making; participatory educational process; organisation and planning; gender sensitivity; and group dynamics. It was annually revised based on previous experiences. During the ToF courses, participants practised FFS implementation by conducting full-season 'practice FFS' as part of the curriculum. After graduation they were able to implement FFS independently.

The original prime objective of the FAO-EU IPM Programme was to develop a cadre of IPM facilitators capable of educating 50,000 farmers per year. During the Programme, 54 season-long ToF courses were conducted, of which 25 were EU financed (against 21 planned). A total of 1,542 participants graduated from these courses. Most graduates were government field and extension staff, but they also included NGO employees in some countries. In China, Vietnam and the Philippines, additional 285 IPM facilitators that had previously been trained in rice or vegetable FFS were given refresher courses to conduct cotton FFS.

However, it was not only training capacity that needed to be developed, but also management capacity. As the Programme grew, an increasing number of the most experienced field staff were therefore assigned to assist in project implementation as district and provincial coordinators and expert facilitator coaches.





**ToF Courses and Graduates in the Programme Countries 2000-2004**

Country	Total		FAO-EU Programme		Government/ Others	
	No.	Graduates	No.	Graduates	No.	Graduates
<b>BANGLADESH</b>	3	103	3	103	-	-
<b>CHINA</b>	8	225	8	225	-	-
<b>INDIA</b>	26	687	5	164	21	523
<b>PAKISTAN</b>	12	325	4	100	8	225
<b>PHILIPPINES</b>	1	80	1	80	-	-
<b>VIETNAM</b>	4	122	4	122	-	-
<b>TOTAL PROGRAMME</b>	<b>54</b>	<b>1,542</b>	<b>25</b>	<b>794</b>	<b>30</b>	<b>748</b>

Maintaining the quality of FFS implementation was a major Programme concern. Impact assessment activities helped focus attention on project results and clarified country strategies for goal achievement. The Programme improved its monitoring and reporting system and developed checklists for key processes; it started *Annual Planning and Refresher Practica* to strengthen facilitation skills and organisational development; it set up farmer and facilitator research activities for continuous learning, knowledge generation and improvement; it established farmer alumni groups and district facilitator meetings as “*quality circles*” to self-assess and improve project activities.





## TRAINING OF FARMER FACILITATORS FOR OWNERSHIP



Neither the training nor utilisation of farmer facilitators was envisaged in the original Programme document. However, based on the developments and experiences of the *FAO Regional Community IPM Programme*, farmer facilitators were already widely adopted at the start of the Programme in 1999.

Following this trend, all Cotton IPM member countries except the Philippines organised farmer ToF (FToF) courses. By the end of 2004, 979 FFS alumni were trained as farmer facilitators in 44 FToF; of these, 33 were EU-funded.

The training of farmer-facilitators varied from country to country. In Bangladesh and Vietnam,

FToF were season-long experiences, starting with 10-14 day refresher courses focusing on organising FFS and facilitation skills. This was followed by weekly sessions and practice FFS. In China, FToF lasted for only 10 days during which farmer-facilitators were trained in aspects of FFS organisation, including facilitation skills and technical issues. In Pakistan, farmers met 3 days per week for an entire season and conducted a practice-FFS. In India, after a 2-week introductory course, farmers were teamed up with experienced facilitators to conduct field schools.

As this activity emerged in the penultimate year of the Programme, it challenged national IPM programmes to sustain the use and expansion of farmer facilitators, which are seen as an important element for the long-term sustainability and expansion of IPM-FFS activities.





### FToF Courses and Graduates in the Programme Countries 2000-2004

Country	Total		FAO-EU Programme		Government/ Others	
	No.	Graduates	No.	Graduates	No.	Graduates
<b>BANGLADESH</b>	6	90	6	90	-	-
<b>CHINA</b>	16	296	16	296	-	-
<b>INDIA</b>	11	376	3	105	8	271
<b>PAKISTAN</b>	5	154	2	71	3	83
<b>PHILIPPINES</b>	-	-	-	-	-	-
<b>VIETNAM</b>	6	63	6	63	-	-
<b>TOTAL PROGRAMME</b>	<b>44</b>	<b>979</b>	<b>33</b>	<b>625</b>	<b>11</b>	<b>354</b>

In view of the importance of expanding cotton IPM through farmer-to-farmer education, it was vital to monitor the effectiveness of farmer facilitators. The Indian project developed a model for quality assurance monitoring of FFS, F2FS and alumni groups. District officers monitored administrative aspects while 3-4 FFS facilitators monitored technical and communication aspects. In Pakistan, IPM and FFS quality indicators were developed and field-tested.







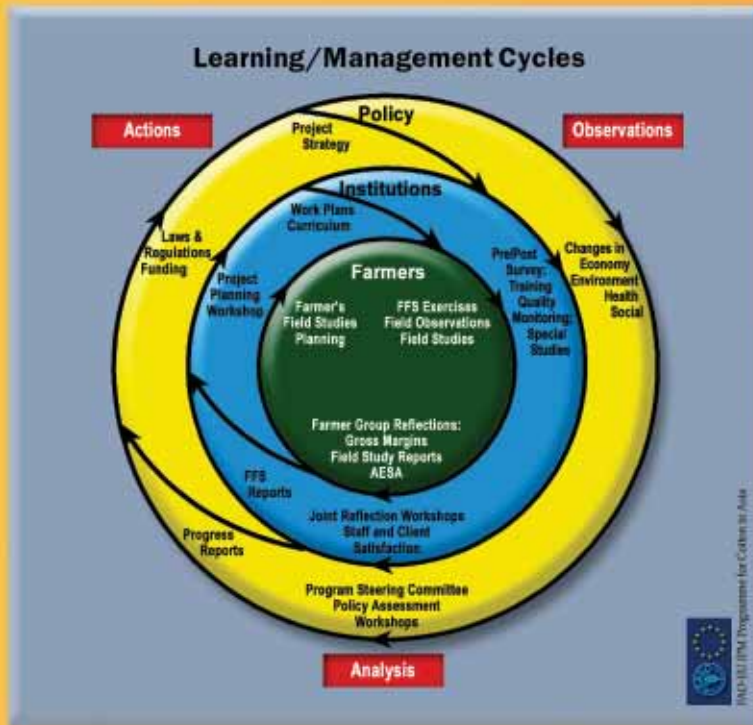
# COUNTRY PROJECT RESULTS

**T**he FAO-EU IPM Programme for Cotton in Asia had six participating countries: Bangladesh, China, India, Pakistan, Philippines and Vietnam.

While most Programme activities were financed by the European Union, additional contributions and funding came from national and local governments, and even from farmers. In Pakistan, the FAO-EU Programme was implemented together with an Asian Development Bank cotton

IPM project and an Arab Gulf Fund contribution under the umbrella of the National IPM Programme.

Project results were achieved at three different levels: farmers, institutions and policy. Project activities on each of these levels followed one and the same learning cycle starting with observation and collection of data, proceeding to their collective analysis and discussion, and coming full circle with the planning of new and improved activities. Thus, in the cycle, learning farmers were augmented by learning facilitators and institutions in order to achieve a complete and holistic system development approach that may affect national policies and regulations.







## BANGLADESH: HOPE FOR RURAL COMMUNITIES

In Bangladesh, the project succeeded in training the number of field school facilitators required to reach the targeted number of farmers in the main cotton growing districts. Half of these facilitators were farmers themselves. However, they still need to conduct enough farmer field schools to reach the critical numbers of farmers necessary for a durable momentum for community change.

The Programme has been able to set the direction for change in the minds of 3,700 farmer beneficiaries. Cotton IPM alumni have shown enhanced management of their cotton fields and also applied newly-acquired confidence and skills to managing other crops, not to mention certain aspects of their personal lives. Compared to their neighbours, FFS farmers have shown themselves more ready to share their knowledge and help other farmers in such activities as field trials. Potential leaders amongst IPM alumni have

emerged. These core groups of farmers have become a valuable resource to their communities, improving the conditions of poor farmers in terms of income-generating capacity, food security, occupational health and environmental conservation. In effect, the project helped mobilise the country's social capacity in cotton growing districts.

FFS graduates have been able to reduce their pesticide applications from 15-20 to 2-3 sprays per season, with the consequent positive impact on the environment, farmers' health, cotton yield and income. Moreover, with new strategies, such as intercropping vegetables with cotton, farmers have discovered through their own field studies that they can increase profits by as much as 75% compared to growing cotton alone. The success of the project is reflected in the enthusiasm and interest of the farmers, who have started applying IPM in their own fields or experimenting with new





ideas. On field days, neighbouring farmers, village leaders and elders have enjoyed learning about the IPM process from FFS farmers interacting with them. The positive experience has inspired many FFS graduates to help as farmer facilitators. Besides being a more cost-effective training alternative, the initial group of farmer facilitators demonstrated that they could successfully conduct field schools and supplement the government's rural extension system.



### COUNTRY PROFILE

% Rural poverty	53%
Annual pesticide use	12,000 t
Cotton area	40,000 ha
Cotton farmers	80,000
FFS farmer cotton plot size	0.35 ha

### PROJECT PROFILE

**Project implementing institution:**  
Cotton Development Board (CDB) with support  
from the Department of Agricultural Extension

No. ToF / FToF	9
No. IPM-FFS facilitators	193
No. FFS / F2FS	148
No. FFS farmers	3,700







## CHINA: BRINGING ABOUT SYNERGY OF FARMER EDUCATION AND TECHNOLOGY

In the vast cotton production areas of the Yangtse and Yellow River basins in China, the cotton IPM project focused its attention on about two dozen townships in the provinces of Anhui, Hubei and Shandong, and a few locations in Henan and Sichuan. The Programme succeeded in establishing a strong team of young and gender balanced facilitators. 'Science by farmers' and team building were major components of the facilitator training curriculum. Farmer education in IPM resulted in reducing pesticide applications from around 12 to 7 per season, both for farmers directly participating in FFS and their neighbours.

The FAO-EU project in China was successful according to a number of criteria. In spite of the Government's strong push towards higher production through genetically modified Bt cotton, IPM remains a vital component of the country's long-term cotton strategy and is relevant to the country's perceived needs. IPM field schools

can add significant value to the use of Bt cotton. The commitment of provincial and local governments to co-financing FFS throughout the project period is a strong indication of national interest in IPM implementation. However, there is a need to extend IPM methods to entire farming systems and for the conservation of China's rich agro-biodiversity.

Farmer research showed that Bt cotton reduces the need for pesticide applications against bollworm and thereby complements IPM, but may not contribute substantially to profitability due to its higher seed cost. An independent study conducted in cooperation with Hannover University in Germany demonstrated the importance of seed quality for the benefits that can be achieved from Bt cotton. The normal farmer practice of saving seed or purchasing low-priced uncertified new Bt seed may lead to substantially reduced bollworm control. The Hannover study also showed that Bt varieties alone







without IPM did not always lead to a lower number of sprays and that high quality seed with no sprays resulted in only average yields. Since the adoption of Bt, farmers have reported the emergence of previously unreported insects as new pest problems and pesticide use appears to be on the rise again in some Bt cotton areas, signalling a sustained need for IPM despite the widespread adoption of Bt cotton.

### COUNTRY PROFILE

% Rural poverty	4.6%
Annual pesticide use	260,000 t
Cotton area	4,800,000 ha
Cotton farmers	10,000,000
FFS farmer cotton plot size	0.22 ha

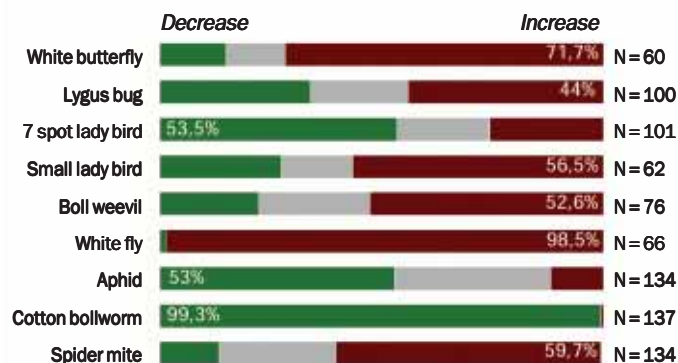
### PROJECT PROFILE

Project implementing institution:  
National Agro-Technical Extension and Service  
Center (NATESC), Ministry of Agriculture

No. ToF / FToF	24
No. IPM-FFS facilitators	637
No. FFS / F2FS	1,061
No. FFS farmers	29,654



### Farmers' perception on changes of cotton insects since Bt adoption



From: D. PemsI, Productivity Analysis of Bt-Cotton-A case study from China, 2003



# INDIA: EXPANDING COTTON IPM

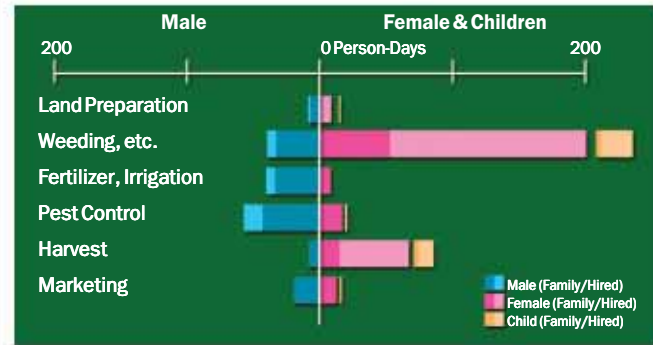
The FAO-EU project had a remarkable impact in the central Indian States of Karnataka and Maharashtra and to a lesser extent in Andhra Pradesh. In those states, farmer field schools have been accepted as the model for government-farmer interaction, and state funds have been allocated to continue and expand project activities. To secure the success of these ambitious plans, continued technical assistance is required, otherwise a decade of substantial IPM gains in India and the achievements of the FAO-EU Programme might become undone.

The project achieved its implementation targets due to the keen interest of the State governments and cooperating NGOs in sustainable rural development. A total of 26 ToF were conducted, as compared to a target of seven, and 1,456 FFS compared to 1,220. State governments contributed significantly to the continuity of the IPM-FFS programme. They assigned 600 trained extension staff to promote IPM

in 2004 and allocated funds for ToF, FFS and F2FS, as well as for the support of 380 FFS alumni groups. State governments also contracted NGOs or individual farmer facilitators (IPM entrepreneurs) to conduct FFS on cotton and other crops.

NGOs were significant partners in project implementation, especially on organic cotton and in their support of farmer clubs. The project employed

**Labour Distribution • Karnataka, India**







### COUNTRY PROFILE

% Rural poverty	30.2%
Annual pesticide use	40,000 t
Cotton area	8,800,000 ha
Cotton farmers	10,000,000
FFS farmer cotton plot size	1.8 ha

### PROJECT PROFILE

**Project implementing institution:**  
**Directorate of Plant Protection Quarantine and Storage, Department of Agriculture**

No. ToF / FToF	37
No. IPM-FFS facilitators	1,106
No. FFS / F2FS	1,456
No. FFS farmers	35,828

a special officer in charge of NGO liaisons. A total of 109 NGO staff were trained as facilitators and conducted their own FFS with financial support from the project or state governments. One NGO, which was also in charge of the impact assessment study, continued to develop sustainability and quality assurance for its own FFS.

Women's participation in FFS increased from 7% in 2000 to 20% in 2004. This was particularly significant since a socio-economic and gender analysis of cotton production showed that: women provide 64% of the work; the crop is often collaboratively managed by husband and wife; and 50% of female-headed and marginal (women-run) households grow cotton. To stimulate women's participation, 66 FFS were held exclusively for women (where husbands attended as 'observers'), many of them illiterate. Exercises on pesticide



poisoning and the adverse effect of pesticides on the environment and community health helped to stimulate the women's interest in FFS and strengthened their decision-making power and control over resources.





## PAKISTAN: NATIONAL POLICIES AND FARMER MOBILISATION

The FAO-EU Programme had perhaps its greatest impact in Pakistan. The country did not have previous experience with IPM field schools, and yet, as of 2004, the two main cotton producing provinces, Sindh and Punjab, have embraced IPM farmer field schools as the dominant interface between government and farmers. FFS fills a need that regular extension apparently has not been able to satisfy. Senior officials have acknowledged IPM-FFS as an approach that is able to enlist farmers in rural development programmes. Therefore, Sindh Province has included FFS expertise in the job description of its agricultural officers, and Punjab has launched a major programme expansion initiative to conduct 3,500 year-long FFS in cotton-wheat management over the next 4 years. Reduction of production costs through lower pesticide use is recognised as an important element in the competitive position of Pakistani cotton in the world market.

In Pakistan, the FAO-EU Programme helped establish a strong National IPM Programme which not only became the joint implementing unit for the EU and ADB funded projects, but also addressed pesticide policy issues with ministerial decision-makers. Despite a powerful pesticide industry, the country has embarked upon its own National IPM Project that will cover four provinces and last five years. This project will be entirely funded from national and provincial sources. However, the young National IPM Programme requires continued technical assistance in order to become a significant player in sustainable rural development and poverty reduction. Impact studies in Pakistan have shown that the number of FFS farmers below the official poverty line was reduced by 12% as compared to a control group within three years.

NGOs and inter-governmental agencies such as CABI Bioscience, World Wildlife Fund, Caritas,





Plan Pakistan, and local welfare associations became active partners in the implementation of FFS. To encourage women’s participation, an AGFUND initiated project on “Pesticide Risk Reduction for Women in Pakistan” focused on training female facilitators to reach rural women in the traditional, gender-segregated society through *Women Open Schools*. Emphasis was on the toxicity and health risks of pesticides, but other elements in the cotton-based farming systems were also included. A total of 968 rural women participated in this programme with additional support from Programme funds.

Significant social mobilisation and empowerment was evident from the formation of officially registered farmer alumni associations and associations of IPM facilitators offering facilitation services and farmer club support. In 2004, five of the latter organisations were contracted to implement 80 FFS.

#### COUNTRY PROFILE

% Rural poverty	35.9%
Annual pesticide use	10,200 t
Cotton area	2,930,000 ha
Cotton farmers	1,310,000
FFS farmer cotton plot size	2.7 ha

#### PROJECT PROFILE

**Project implementing institution:**  
National IPM Programme of the National  
Agricultural Research Centre (NARC)

No. ToF / FToF	17
No. IPM-FFS facilitators	479
No. FFS / F2FS	525
No. FFS farmers	12,999







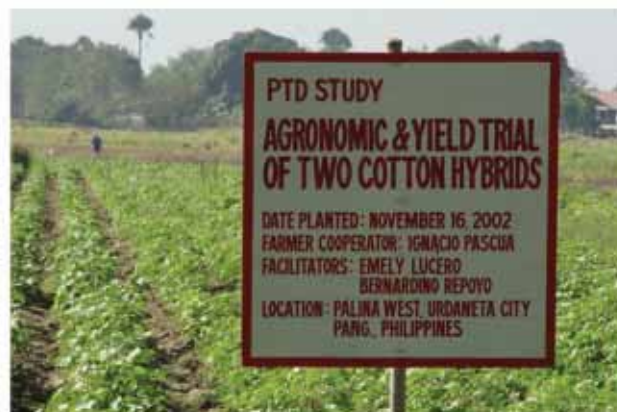
## PHILIPPINES: NEW OPPORTUNITIES FOR THE RURAL POOR

Only a few project activities were implemented in the Philippines due to the minor importance of cotton in the country. Increased production costs and very low profits received by Filipino farmers for their cotton have led to a sharp reduction in the cotton area from 30,000 ha at the time of project formulation to 1,000 ha at project start. Even though there exists a strong National IPM Programme that has created a favourable policy climate for farmer field schools, cotton was no longer the crop to focus on.

Jointly implemented by the Cotton Development Authority (CODA) and the National IPM Programme, project activities focused on supporting existing facilitators from local government units in conducting FFS on cotton. A major problem encountered during the training was identifying enough cotton farmers. In Luzon, over 40% of all cotton growers were educated in

FFS between 2001 and 2003. The Programme later shifted its attention to the cotton growing areas of Mindanao and Negros Oriental.

Cotton production 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. Under the project, CODA made an effort 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.

Cotton is the primary source of fiber for the Philippines' important textile industry. It accounts for about 53% of the total fiber requirements of the country's spinning mills. Without a significant domestic production of cotton, the country relies heavily on imports, averaging 58,000 metric tons valued at US\$ 47 million, from the major cotton exporters such as the USA, Australia, and Pakistan.

Cotton production is potentially a technically feasible and economically viable industry in the Philippines, as proven by almost two decades of experience. In 1992, the cotton area reached over 35,000 hectares distributed over 25 provinces nationwide. During those early years, support services were provided by the government

#### COUNTRY PROFILE

% Rural poverty	50.7%
Annual pesticide use	N. A.
Cotton area	2,000 ha
Cotton farmers	1,000
FFS farmer cotton plot size	0.72 ha

#### PROJECT PROFILE

**Project implementing institution:**  
Cotton Development Administration (CODA) and  
the National IPM Programme of the Department  
of Agriculture

No. ToF / FTof	1
No. IPM-FFS facilitators	104
No. FFS / F2FS	43
No. FFS farmers	920

through PhilCotton. But when the government privatised commercial cotton production, the private business sector could not sustain a mutually profitable relationship with the cotton farmers. The advancement of the industry was constrained by inaccessible credit, policies favouring cheap imports and inadequate extension assistance.





## VIETNAM: ENVIRONMENTAL EDUCATION FOR THE POOR

**I**n Vietnam, the FAO-EU project was implemented by the Vietnam Cotton Company (VCC) with some collaboration from the National IPM Programme, which has extensive experience with FFS in rice and vegetables. Every season, VCC signs contracts with growers under which it provides technical support, seeds, and inputs - including pesticides - and buys the crop at an agreed price. However, from the farmers' point of view, the economics of cotton production has deteriorated since 2002. In this setting, FFS education in farmer empowerment and independent decision-making appeared not to be well placed. Since pesticide use in rainfed cotton had already been reduced to 1-2 sprays per season, there was little opportunity for significant pesticide reduction, and farmer benefits from IPM-FFS came mostly from a better ecological understanding and increased confidence in field experimentation and knowledge generation.

By the end of the project, a total of 122 government facilitators from VCC and the National IPM Programme were trained. By March 2004, over 10,000 farmers had participated in cotton IPM farmer field schools.

The project commissioned a number of special studies. These included a gender study conducted by the Vietnam Women's Union; a study on biological control-based integrated management of sucking cotton pests; and an impact assessment study. Both of the latter were conducted by the University of Agriculture and Forestry in Ho Chi Minh City. Two students from Wageningen Agricultural University in the Netherlands carried out field research on predatory wasps that are natural enemies of caterpillar pests in cotton.







IPM is well established in Vietnam and FFS are conducted well. However, there was only minimal financial support for IPM-FFS from national sources. While Vietnam's official policy promotes IPM, some of the operational aspects still need to be strengthened and defined.

#### COUNTRY PROFILE

% Rural poverty	57.2%
Annual pesticide use	11,000 t
Cotton area	20,000 ha
Cotton farmers	40,000
FFS farmer cotton plot size	0.78 ha

#### PROJECT PROFILE

Project implementing institution:  
Vietnam Cotton Company (VCC) with support from  
the National IPM Programme under the Plant  
Protection Department

No. ToF / FTof	10
No. IPM-FFS facilitators	286
No. FFS / F2FS	428
No. FFS farmers	10,615





## REGIONAL SUPPORT AND COORDINATION: ADDING VALUE TO COUNTRY ACHIEVEMENTS

The focus of the Programme Management Unit in Bangkok was to add value to the country projects through regional workshops, exchanges and studies. Much of the Programme's success was due to its regional character that

- ❑ *accelerated implementation by promoting competition*
- ❑ *shared costs on common issues*
- ❑ *enhanced sustainability through optimising resources*
- ❑ *shared experience and knowledge*
- ❑ *avoided pitfalls*
- ❑ *built a regional database and expertise on impact assessment and*
- ❑ *promoted a better understanding between countries in Asia.*

The following regional workshops and meetings were held:

- ❑ **Cotton IPM Planning and Curriculum Workshop, Bangkok, Thailand, 28 February - 2 March 2000**
- ❑ **Regional Workshop on Helping Farmers to Understand Microbial Organisms Used to Manage Pests, Chainat, Thailand, 11 - 17 February 2001**
- ❑ **Regional Workshop on IPM Impact Assessment Methods, Ho Chi Minh City, Vietnam, 25 - 31 March 2001**
- ❑ **International Meeting on Bt Cotton Study in China, Bangkok, Thailand, 4 - 5 May 2001**
- ❑ **Regional Meeting on Planning and Evaluation, Ho Chi Minh City, Vietnam, 10 - 15 September 2001**
- ❑ **Regional Workshop on FFS/ToF Curriculum Evaluation to Strengthen Farmer Education, Dhaka, Bangladesh, 11 - 20 March 2002**



- ❑ **International Course on Weed Ecology for Cotton IPM**, Pangasinan, Philippines, 22-29 September 2002
- ❑ **Programme Steering Committee Meeting**, Chizhou, Anhui, China, 8-15 September 2002
- ❑ **Regional Seminar of IPM Impact Assessment**, Ayutthaya, Thailand, 30 March - 4 April 2003
- ❑ **Regional Workshop on Enhancing Facilitation Skills of IPM Facilitators**, Cebu City, Philippines, 14 - 23 September 2003
- ❑ **Regional Workshop on IPM-FFS Impact**, Bangkok, Thailand, 30 June - 3 June 2004
- ❑ **Regional Policy Seminar on IPM-FFS Impact**, Bangkok, Thailand, 4 June 2004



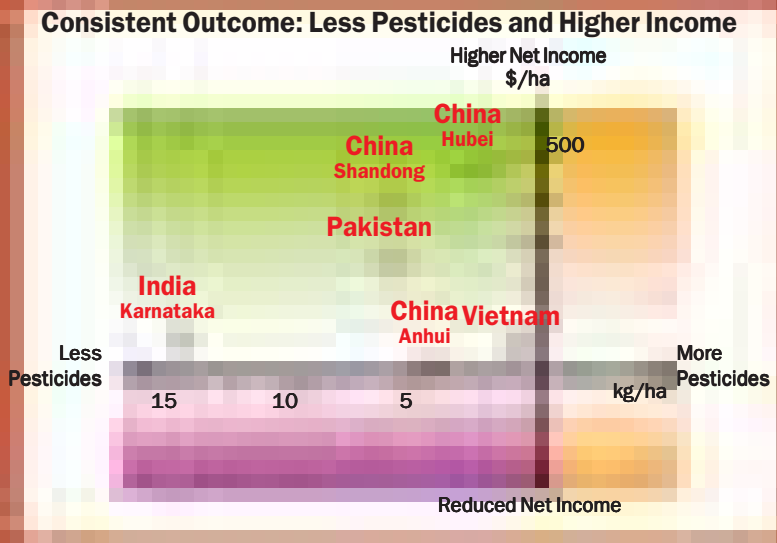




Impact assessment was an integral part of the FAO-EU Programme, and it was used as an instrument for strategic planning and organisational development. In preparation for the seven impact assessment studies conducted by independent investigators, each country's project stakeholders engaged in an intensive dialogue to define the impact targets and to formulate objectively verifiable indicators for successful implementation. This process was extended to FFS implementation by engaging farmers in monitoring and evaluation. Thus, systematic progress and quality monitoring of the Programme supplemented formal impact studies in assessing the direction and success of the Programme.

Cost-benefit analysis showed an internal rate of return on investment of 16% for the period of Programme implementation and only three seasons of project-funded farmer field schools. This confirms the high economic worth of investment in farmer education. It was conservatively assumed that the benefits from IPM-FFS would only occur with 80% of the project-trained farmers for a period of two years after training. Potential benefits from the Programme's substantial long-term investments in training capacity were not included in these calculations.

Backed by credible evidence and convincing results of having increased farmer income while lowering environmental risks from pesticides, impact assessment also became a tool for policy discussions with ministerial decision-makers. At a Regional Policy Seminar on IPM-FFS Impact in June 2004, results from the impact studies in five countries were presented and discussed. It was concluded that the Programme contributed to the Millennium Development Goals of reducing poverty, empowerment of women and environmental sustainability, and to international treaties such as the International Programme on Chemical Safety, the Stockholm Convention on Persistent Organic Pollutants, the Rotterdam Convention for Prior Informed Consent and the Convention on Biological Diversity.



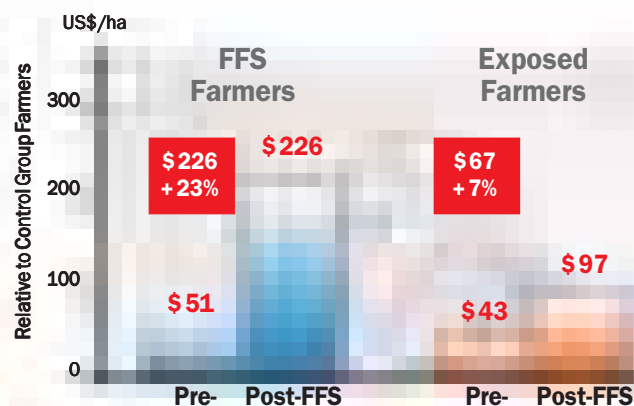
**B**y targeting small-scale farmers and relying on ecological processes rather than expensive inputs, the FAO-EU Programme contributed positively to rural poverty alleviation. FFS graduates were shown to benefit from significantly higher profits which could be used for better nutrition, child education or debt reduction, ensuring a brighter future for their families.

As a result of IPM-FFS, the gross margin income (gross revenue from sales minus cash expenditures) of FFS farmers increased substantially by an average of \$175 per ha or 23% relative to the control groups. This increase in income came mainly from two sources: higher cotton yields and reduced pesticide expenditures. While the average yield in the control group declined by 5% between the sample years, FFS farmers managed to increase their yields by 3%

over the same period giving them a significant advantage of 8% more yield over control farmers while having reduced their pesticide costs by 46% or an average of \$32 per ha.

### Impact of IPM-FFS on Farmer Income

Gross margin increase relative to control  
(average of 1,060 farmers in 5 countries)

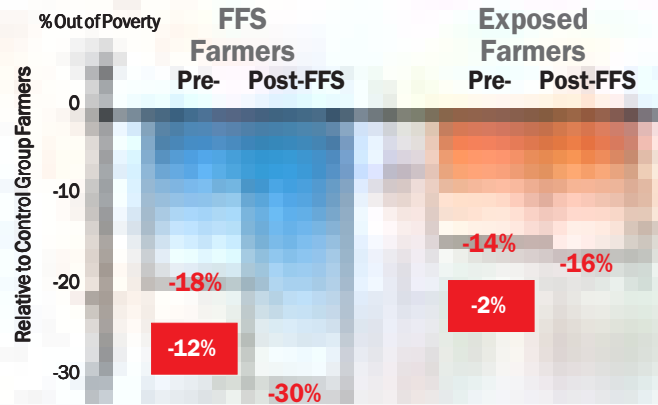


Neighbours of FFS farmers also increased their income, though to a lesser degree. Compared to the control group, their gain was only \$57 or 7%. These results indicate that there is a slight diffusion of benefits from FFS farmers to their neighbours in the same village. However, the decisive skills that determine the full economic benefit were only acquired by FFS participants. While attitudes, some kinds of knowledge and simple skills may easily diffuse to non-FFS farmers, the more complex skills of ecology-based pest management and informed decision-making that determined higher incomes was only found among FFS participants.

Since FFS participants were predominantly small-scale, poor and disadvantaged farmers, their household income increases contributed to poverty

### Impact of IPM-FFS on Poverty Reduction

% farmers out of poverty relative to control  
(average of 190 farmers in Pakistan)



reduction. Figures from Pakistan showed that before the FFS education 71% of the participants were below the poverty line. After the FFS, this number fell to 55%, while it only fell by 4% in the control group. This 12 % net decline in poverty over three years demonstrates the huge potential of IPM-FFS programmes to reduce rural poverty.



# IPM-FFS

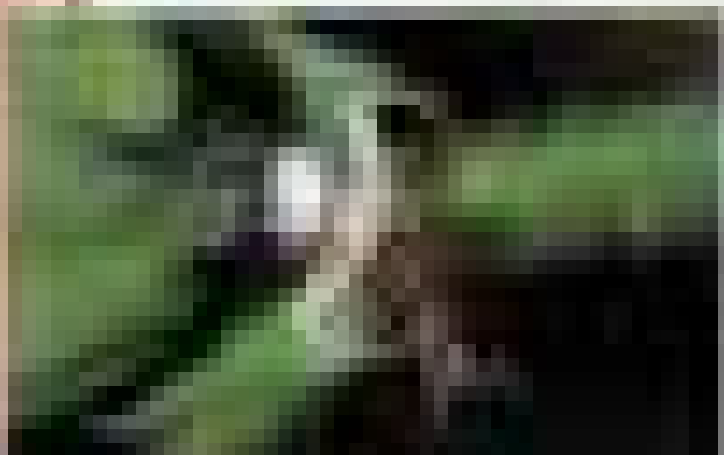


**I**PM significantly increased the biodiversity in agricultural fields by conserving natural enemies and maintaining sound ecological balances. By having observed and understood ecological interactions through self-discovery exercises during FFS, farmers became highly motivated guardians of natural enemies in their fields and avoided using pesticides out of conviction rather than because they were instructed to do so.

By targeting the crop that receives the biggest share of pesticides in Asia, the Cotton IPM Programme helped reduce environmental risks

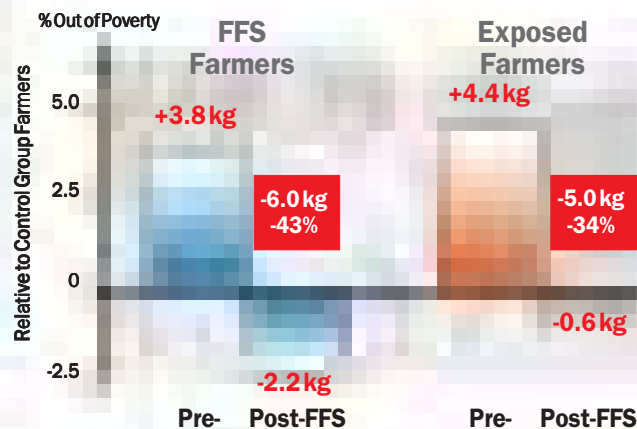
from toxic chemicals and improved biodiversity in large rural areas.

Overall results from the impact studies showed that after attending FFS, farmers reduced their insecticide use by an average of 43% relative to control farmers, who in some cases had even increased their usage. In addition, there was a noticeable effect on the entire village, as the FFS neighbours also reduced their insecticides by an average of 34%. After having heard about the bad effects of pesticides, these farmers simply followed their FFS neighbours, but without having gained the latter's decision-making skills. The accumulated annual pesticide reduction is estimated at 1,800 tons fewer pesticides used on about 250,000 ha.



## Impact of IPM-FFS on Pesticide Reduction

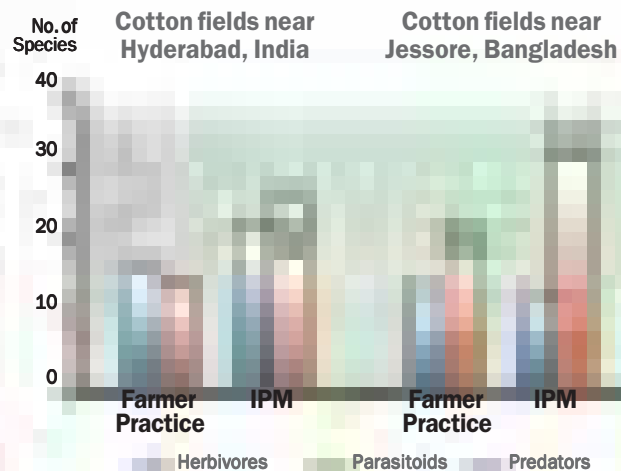
kg/ha decrease relative to control  
(average of 1,060 farmers in 5 countries)



More differentiated analyses arrived at by computing the *Environmental Impact Quotient* (EIQ) for the pest control practices of FFS participants, suggested that the reduction in terms of environmental risk exceeded that of the pesticide amount. This indicates that FFS farmers selectively reduced the most harmful products because they understood their effects on the natural enemies in the environment.

Positive effects of IPM on the biodiversity in cotton fields were evident from data collected during FFS. Results consistently showed more natural enemies and higher species diversity in IPM plots as compared to the farmer's fields. This was confirmed by post-FFS observations conducted in China which found that the late-season populations of spiders and ladybird beetles increased two to three fold. In Pakistan, the average predator-pest ratio increased from 0.72 in farmer fields to 1.06 in IPM plots. A comparison study in Bangladesh and India showed that the total number of insect species found in cotton fields increased by 45% in IPM fields. This increase was found to be mainly due to natural enemies, namely predators and parasitoids, which were almost absent in the conventional farmer practice plots.

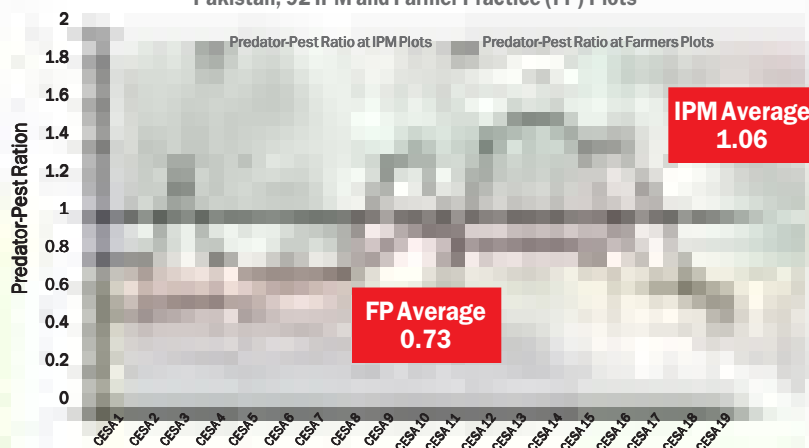
### FFS Impact on Species Diversity



Other positive environmental effects from IPM come from a reduction of nitrogen fertilizer and a rational “intercropping” with weeds, as a source of fodder for the animals or as herbs for human consumption. Though minor, the increase in plant biomass in IPM fields positively contributes to the absorption of carbon from the atmosphere.

### FFS Impact on Predator-Pest Ratio

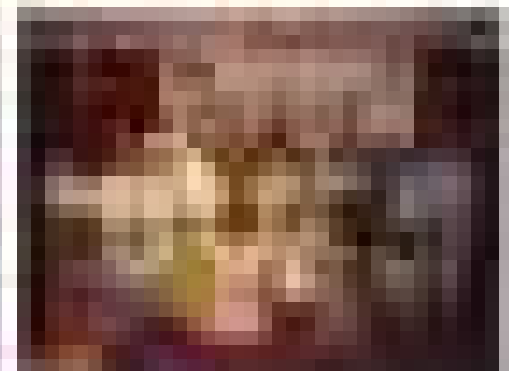
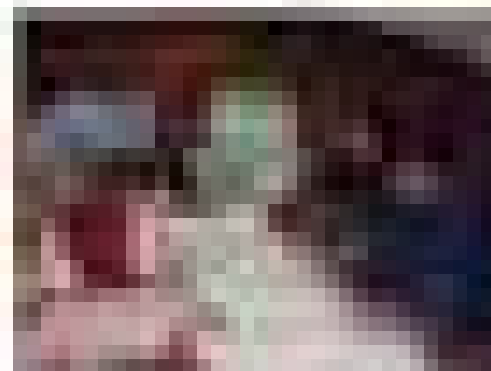
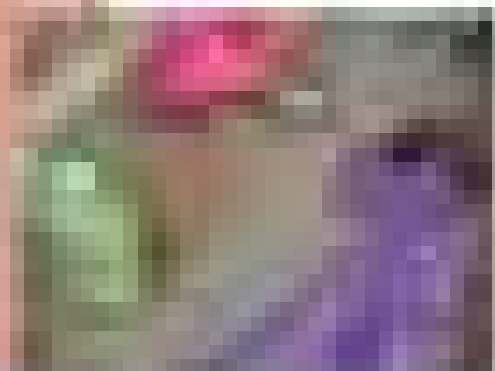
Pakistan, 92 IPM and Farmer Practice (FP) Plots



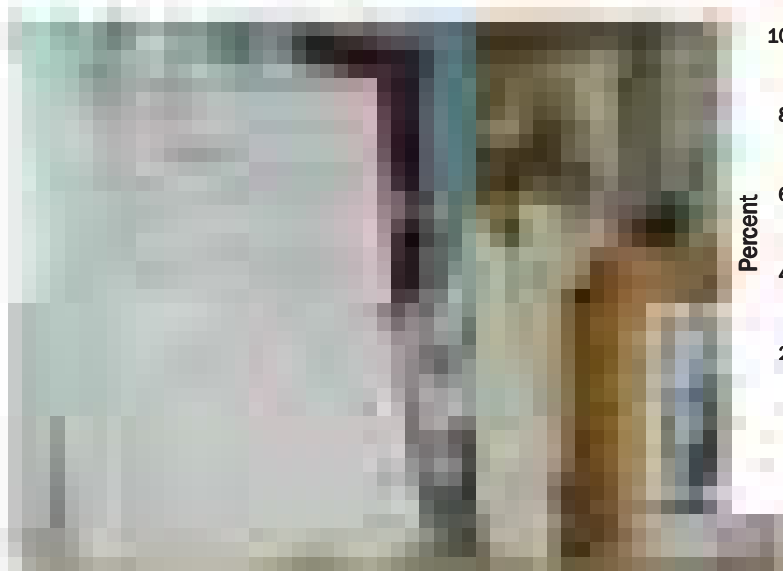
**I**mpact study data from countries with small plot sizes such as China and Vietnam indicated few poisoning cases. However, in India and Pakistan, where farmers spray two to three hectares, an average of three to eight workdays per season was lost due to poisoning, and medical expenditures of \$14-36 per household were reported.

A detailed study in three Indian villages revealed that the incidences of pesticide poisoning were far more frequent than commonly reported. A group of 97 male and female farmers self-monitored for poisoning signs and symptoms within 24 hours after spraying pesticides for a period of 4 months. Of the 325 records, severe poisonings (seizures, unconsciousness) happened in 6% of cases; 38% recorded moderate signs such as nausea, tremors or blurred vision; and 39% had mild signs and symptoms such as dizziness, burning eyes, skin rashes or excessive salivation.

Only in 16% of the sprays were no signs or symptoms recorded. Results showed that women farmers were also exposed to pesticides, as they frequently helped with the mixing of the pesticides or worked in the field during spray operations.

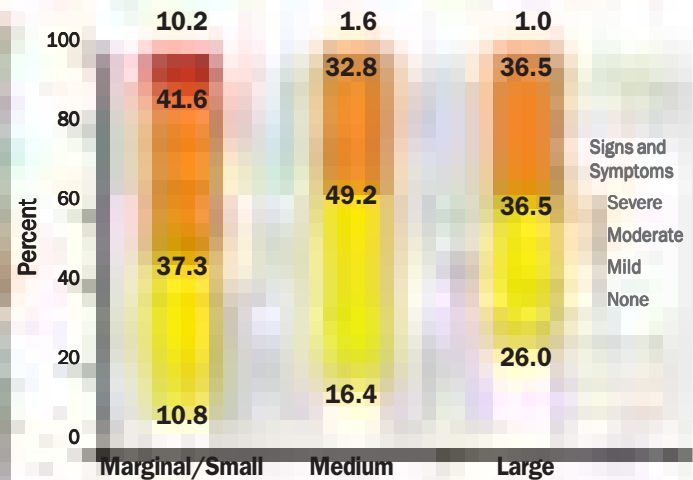






### Pesticide Poisoning Incidences in India

Percent cases among 97 male and female farmers after 325 pesticide applications over 4 months



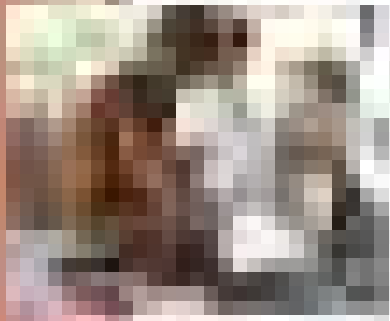
Consequently they were as often affected as male farmers who actually carried out the spraying. Surprisingly, low income marginal farmers with less than two hectares were found to be ten times more often subject to severe poisoning (10.2 %) than landlords (1.0 %) with more than eight hectares of land, showing that it is the poor who bear most of the burden from pesticide poisoning. The study also revealed that farmers sought medical treatments or stopped working only in severe cases — which are the only ones that enter official statistics.

Studies conducted in Pakistan showed that not only pesticide applicators are affected by pesticide poisoning, but also the thousands of farm workers - mostly women and children - who pick the cotton. Of the sample investigated, almost all (87%) women reported pesticide related sickness

during the picking season and an average loss of five workdays, which is considerable as cotton picking may be the only opportunity for them to earn some cash during a year. The investigations showed that cholinesterase, an enzyme necessary for the proper functioning of the nervous system, was reduced to hazardous levels among 42% of such women. Results from these studies became the basis for a documentary film titled “Hands Picking Poison”.

IPM-FFS not only aims to eliminate unnecessary pesticide applications, it also aims to detoxify the farming environment by specifically removing highly toxic WHO Class I compounds. In Pakistan, for example, FFS farmers reduced the use of this class by 54%, while it more than doubled in the control group over the same period.

# Empowering Farmers Through FFS

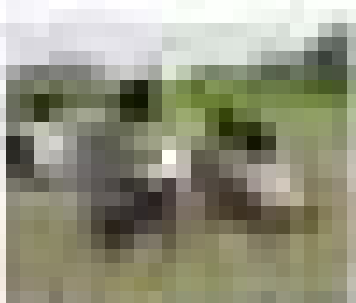
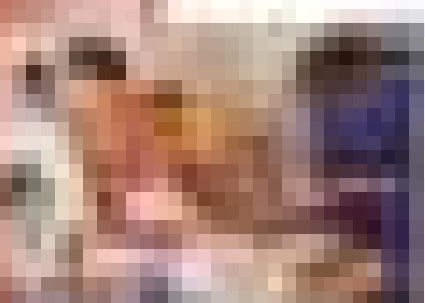


**F**FS empowers farmers to create a safer working environment for themselves and their families. By becoming aware of negative health effects and ways to reduce pesticide applications, farmers can live without the

fear of becoming poisoned, endangering their families and communities, or consuming contaminated farm products.

By improving their observation skills and analytical capacities through self-discovery learning exercises (e.g. ecosystem analysis and insect zoos) farmers enhance management skills, which can then be applied to many aspects of life.

Pre- and post-FFS ballot box tests generally showed a 20-30% increase in scores. The impact studies verified that FFS farmers retained their knowledge and skills, and results showed that FFS graduates had higher levels of pest recognition,

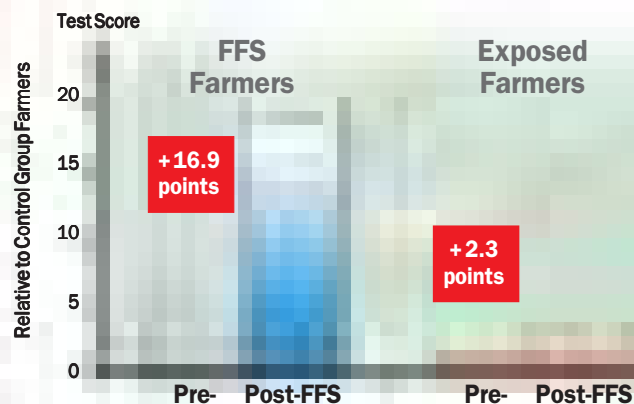


knowledge of natural enemies, improved observation, record keeping and decision-making skills than non-FFS and control farmers. There was little diffusion of newly gained knowledge and skills to exposed farmers in the same village, confirming that - contrary to information and recommendations - skills have to be individually learned and practiced, and do not diffuse to neighbours.

Social recognition was used in Pakistan as an indicator of the organisational capacities of FFS farmers. It measured the degree to which FFS graduates were consulted by fellow farmers. The score increased significantly for FFS graduates, but not for exposed farmers and control farmers.

## Recognition of Natural Enemies

Total score increases relative to control (average of 287 farmers in India and Pakistan)

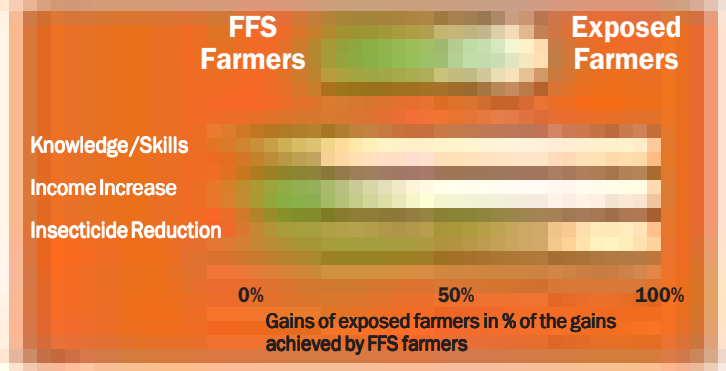


Interestingly, not only the educated farmers enjoyed increased social recognition, but also illiterate farmers.

By encouraging women to attend FFS, the project provided new learning opportunities to women and increased social awareness of gender roles. The average female participation in FFS was 21%, ranging from 2% in Pakistan to 33% in China. Because mixed FFS groups are culturally unacceptable in certain societies, special FFS for women were set up in India, Pakistan and Bangladesh.

FFS graduation ceremonies were to mark the beginning of a learning process, not its end. Though this could not be followed up in the course

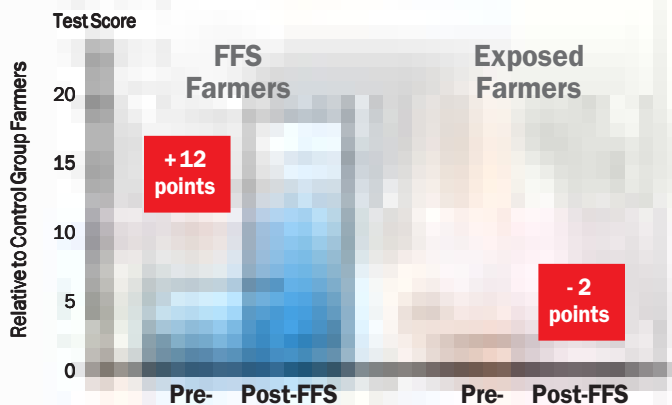
### Diffusion to Exposed Farmers



of the Programme, experience has shown that through it farmers have been enabled to generate new knowledge, conduct field experiments and organise themselves better. In 2004, the Pakistan National IPM Programme organised three farmer congresses for representatives from 180 alumni FFS who decided to organise themselves into a national organisation. By the end of the Programme there existed on village and district levels 56 registered FFS-alumni chapters that were devoted to continuing farmer education on a self-help basis. In India, the Governments of Karnataka and Maharashtra and Andhra Pradesh provided financial support for 380 alumni groups to continue knowledge generating and community development.

### Increase in Social Recognition

Score increases relative to control (average of 190 farmers in Pakistan)







# CONCLUSIONS AND OPPORTUNITIES

Once again, farmer field schools and integrated pest management have proven to be a powerful combination for achieving comprehensive sustainable development for small-scale farmers who are searching for a way out of the vicious cycle of increasing costs and reduced profits. These result from the disrupted ecological processes in their fields which are caused by excessive use of pesticides and other agricultural inputs. In the short period of implementation, the FAO-EU Programme has demonstrated that this approach not only increases the income of poor farmers, it also enables them to conserve agricultural biodiversity, improve community health, become better managers of their resources and work more effectively with fellow farmers in a self-reliant manner to improve the livelihoods of their families and communities.

The achievements of the Programme were confirmed during two independent review missions that were carried out in 2002 and 2004:

A mid-term review took place from 27 October to 18 November, 2002.

Jeff Waage - *Team Leader, IPM specialist*

Robert Moore - *Evaluation specialist*

*(FAO Evaluation Service)*

Marc Debois - *Environment specialist*

*(EU representative)*

Lawrence Shaw - *Agricultural economist*

Edith van Walsum - *Rural development/  
gender specialist*

Piao Yongfan - *Representative of member  
countries*

A final project review took place from 13 August to 3 September, 2004.

Niels Röling - *Team Leader, Agricultural*

*Knowledge and Information Systems*

Robert Moore - *Evaluation Specialist*

*(FAO Evaluation Service)*

Sandhya Chatterji - *Rural development/  
gender specialist*

*gender specialist*

Alida Laurens - *IPM specialist*

Josef Margraf - *Environment specialist*

Iftikhar Ahmad - *Representative of member  
countries*



## MID-TERM REVIEW: ENTHUSIASTIC ENDORSEMENT



The mid-term review team concluded that the Programme was well on track to meeting its objectives. There was strong evidence of post-FFS changed farming practices, farmer engagement and enthusiasm, and governments were committed to supporting and co-financing training activities. Convincing plans to realise the targets of 21 TOF and at least 3,800 FFS were in place, as well as a system for impact analysis. The review team strongly supported the new emphasis by the Programme on the training and evaluation of farmer facilitators as a basis for potential Programme expansion and intensification.

In view of this good progress, the review team recommended that the country projects place more emphasis on building collaboration (i.e. with NGOs, researchers, and the private sector) and supporting policy change, particularly with respect to national IPM initiatives and pesticide regulation. With such an emphasis, promising initial steps in certain countries could be shared across the Programme.

The review team examined several specific activities. Studies undertaken by farmers and facilitators in China on IPM and genetically modified Bt cotton have shown the critical role which IPM education plays in the success of biotechnology for development. The Programme has made a concerted and valuable effort to understand the role of women in cotton IPM, and

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now should act on this to increase their involvement in training and other project activities. Information coordination and dissemination within the Programme should now also include outward communication. Health, specifically pesticide effects, and pesticide regulation were identified as emerging issues deserving more attention by the country projects in future.

The review team paid particular attention to the challenging issue of the spread and sustainability of IPM. It concluded that this requires exploration of scaling-up models for farmer education, action at the national level to reduce pesticide use on cotton, and steady engagement of the research community and NGOs. It was recommended that the Programme

make important steps in this direction (e.g. increasing FTOF), even though a full evaluation of this potential would not be achieved in the Programme period. The review team therefore recommended that an identification mission be made in 2003 to explore opportunities for extending the Programme to more countries and, perhaps, to other farming systems with unsustainable and unhealthy pesticide dependency.



## FINAL REVIEW: “SIGNIFICANT IMPACT”

The final review team concluded that the FAO-EU Programme has had a significant impact in participating countries where cotton is an important crop (i.e. China, India, Pakistan), in terms of uptake of results by national governments. In countries where cotton cultivation is a minor activity, such as Bangladesh, the Philippines and Vietnam, the farmer field school approach has demonstrated the rigour of this approach in enhancing skills of farmers to improve their livelihoods in a cotton-based cropping system.

Overall, the Programme has been especially successful in China, India and Pakistan. This impact has convinced the review team that farmer field schools should receive high priority, also in terms of awareness raising. Major donors such as the EC and many staff within the FAO itself are



FAO-EU IPM Programme for Cotton in Asia



familiar with IPM as a technical subject, but not of the farmer field school as an essential component of it.

It was recognised that the Programme has made a major contribution to the development of the IPM-FFS approach. This was mainly due to the fact that the Programme had built in impact assessment and quality monitoring from the start. These activities have led to new and useful insights into the risks and vulnerabilities of the field school approach that should be actively pursued to further develop the approach.





The success of the Programme in convincing governments of major developing countries of its value, led the review team to the conclusion that FAO should move away from its emphasis on crops, IPM, pesticides, etc., and towards a new framing of the farmer field school within the international donor community. This reframing should emphasise biodiversity, poverty reduction, the education of rural people, water management and other Millennium Development Goals in which field schools have a proven track record.





## REMAINING CRITICAL ISSUES AND OPPORTUNITIES

**R**ecognising the achievements made and the lessons learned, the potential for a major activity on rural poverty alleviation would be a natural follow-up. This environmental risk reduction activity would improve the livelihoods of millions of small-scale cotton farmers resulting in protecting the agro-biodiversity of cotton-based production systems. By fully exploiting the FFS training capacity of more than 50,000 farmers per year and supporting partner countries in their efforts to expand and integrate this approach into their rural development and extension reform strategies, a target of improving the livelihoods of 3-5 million small-scale farmers is within reach.

The commitments by provincial and local governments in China, India and Pakistan are at risk of falling apart or being sidetracked. Failures of the ambitious expansion plans could seriously throw back IPM-FFS promotion in Asia. In order to secure the investments made by the FAO-EU Programme, several critical issues and opportunities remain for the countries, where the Programme has had a significant impact:

### China

- ❑ Cotton IPM needs to be extended to Western China and to include other crops, and should also address conservation of China's precious agro-biodiversity.
- ❑ Additional impact assessment studies involving more villages and ecological conditions and long-term data are necessary to give a more comprehensive picture.
- ❑ Genetically modified Bt cotton is of concern due to the apparent emergence of new pest problems and a rise in pesticide uses. Lessons learnt from China are relevant to India and Pakistan.



### Cotton Production Zones in Asia

■ FAO-EU Cotton IPM Member Countries



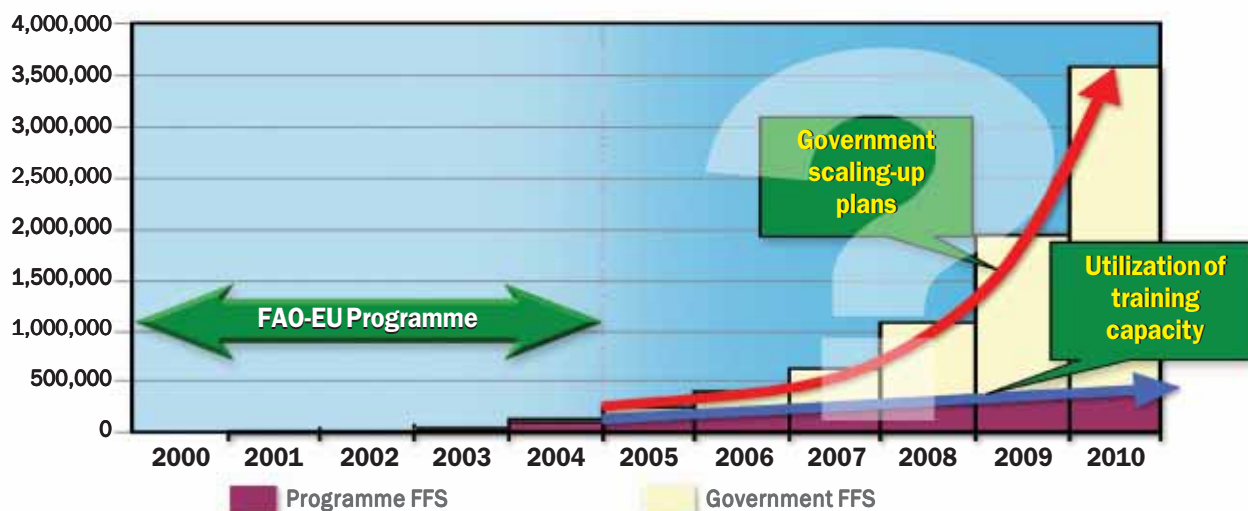
## India

- ❑ The planned rapid expansion of FFS by State Governments requires investments in quality assurance, follow-up and refresher training in educational and empowerment aspects which are not yet in place.
- ❑ A national IPM Programme could facilitate expansion into other states
- ❑ Umbrella FFS alumni organisations could provide important incentives for group sustainability, especially for rural women.
- ❑ Impact assessment studies should investigate the long-term impact on the farmers educated in 2001.
- ❑ Experiences in organic cotton cultivation, gender issues and health monitoring as follow-ups to IPM-FFS should be shared with other countries.

## Pakistan

- ❑ The locally-funded National IPM Project faces risks related to organisational aspects such as inflexible release of funds for FFS implementation.
- ❑ The rapid expansion of IPM-FFS planned by Punjab demands exceptional attention to quality assurance and improved facilitation skills.
- ❑ The newly formed local and regional associations for FFS alumni farmers and IPM facilitators risk disillusionment without start-up assistance and a supporting umbrella structure.
- ❑ Impact assessment studies should be expanded and should investigate the long-term (3-4 years after FFS) impact.

### Potential for Major Impact on Small-scale Farmer Livelihoods

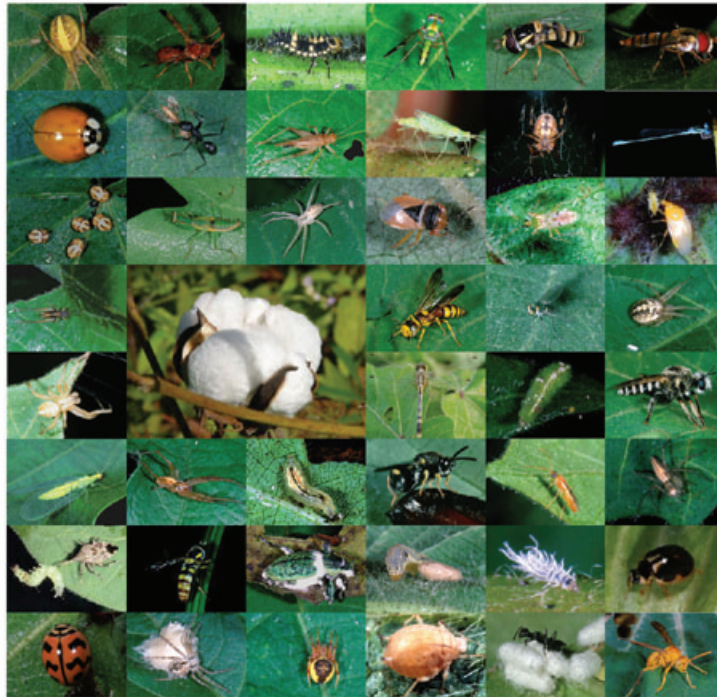








FAO-EU IPM Programme for Cotton in Asia



ENVIRONMENTAL EDUCATION FOR POOR FARMERS