

## Farmer Field Schools on Integrated Pest Management for Cotton in India

### Summary

A long-standing partnership between the Government of India and FAO has enabled Farmer Field Schools (FFSs) to be introduced and subsequently scaled up in the country. In Andhra Pradesh FFS, known locally as “Polam Badi”, has become the official method to train farmers in sustainable approaches to agriculture.

The factors which contributed to the success of the programme are the following:

Government commitment: The Government is committed to innovative approaches to building the capacities of its extension service to meet farmers’ needs, and supported the introduction of the FFS approach leading to a new National Policy for Farmers in 2007.

Stable/strategic allocation of resources: The central government and governments of three states have allocated funds to programmes of farmer training in cotton IPM since 2002.

Appropriate pedagogical design of training: Training programmes for farmers and extensionists were learner-focused, with duration and content selected to match individual development goals. Learners were actively engaged over an entire cropping season, gaining practical experience and refining their analytical and decision-making skills.

Mix of modalities of intervention: A range of international meetings, workshops, and seminars were organised as complementary instruments to sensitise policy-makers on the need to adopt educational programmes enhancing farmers’ knowledge.

Quality of technical inputs and monitoring: Appropriately proficient FFS facilitators, committed to the Field School approach and working closely with government officials, were essential to stimulate participation by farmers and enable discovery learning. Governments established an appropriate system to monitor quality in FFS.

Support to collective action and empowerment: The community approach in FFS supported group formation and empowerment, generating income and fostering socio-cultural activities.

Interactions between different stakeholders: Interactions were facilitated between scientific institutions, universities, and policy-makers at state and central level, creating effective partnerships for integrated strategies/approaches.

### 1. Context

India has the largest number of cotton growers in the world and ranks third in global cotton production after the USA and China. Much of India’s cotton is transformed into garments, one of India’s major agricultural exports. The Government of India (GoI) is strongly promoting these exports and seeking to find ways to expand production, reduce costs and implement economies of scale to meet internal needs and face the strong competition from other Asian countries such as China.

Agriculture in India, and the cotton sector in particular, is highly dependent on the use of pesticides, which creates serious environmental problems,<sup>1</sup> as well as health and economic problems, and contribute to reduced sustainability of agricultural production. The use of

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<sup>1</sup> Contamination of water sources has become a major environmental concern in India. The central Ground Water Board has found high levels of pesticide residues in ground water and in bottled drinking water.

pesticides is also the result of farmers' lack of adequate alternatives, access to information and educational services.

Since the 1980s, the government, through the state level departments of agriculture, has been supporting experimental approaches to bring innovation to its extension service to meet farmers' needs.

In this context the FFS approach was introduced (Box 1) to train farmers in the ecological management of fields, i.e. Integrated Pest Management (IPM).

In order to develop capacity among the extensionists,<sup>2</sup> the first Training of Trainers (TOT) in FFS, at Chithambaram, was organized in Tamil Nadu during 1993 supported by the FAO-Intercountry Programme for IPM-Rice in Asia. Since then, the GoI and partners have implemented other projects<sup>3</sup> in FFS demonstrating the viability of IPM as a means to reduce dependency on chemical pesticides.

Based on these experiences and given the high interest of the Indian government in IPM, in 1999 FAO, in partnership with the European Union (EU), launched a five-year regional programme on IPM for cotton.<sup>4</sup> The programme was active in four states: Andhra Pradesh, Karnataka, Maharashtra and Tamil Nadu. Its aim was to contribute to the alleviation of rural poverty and to protect the environment and human health through the promotion of sustainable agricultural practices, through capacity development. The main objective was to reduce the use of chemical inputs by improving farmers' field management skills.

### **Box 1. "Basics" of Farmer Field Schools**

Farmer Field Schools (FFSs) were first conceptualized and adopted on a broad scale in Indonesia in 1989 to reduce reliance on the use of pesticides in rice cultivation by enhancing farmers' understanding of crop ecology (Kenmore, 1996). The principles supporting the development of the FFSs grew out of the traditions of literacy education and village-level basic health care.

The FFS approach focuses on farmers' self-development and skill building. Farmers become experts in adapting their farming practices to local conditions by testing and adopting innovative solutions. Through weekly field observations and analysis followed by management action, farmers gain expertise and confidence in decision making. The FFS approach therefore reverses the system of top-down, research-driven extension and pays particular attention to the conventional wisdom of farmers. Farmers are no longer positioned as receivers of already developed technological packages but as field experts who collaborate with the government extension staff to find solutions relevant to local realities. FFS outcomes and impacts range from technical achievements to gains in social and human capital.

Basic concepts and essential elements are common to IPM FFS programmes in several countries such as: the practice of agro-ecosystem analysis (AESA) as the decision-making tool for field management; field experimentation to strengthen farmers' analytical skills; and adult non-formal education to enable the learning of all participating farmers. Good FFS require technically strong facilitators and a season-long curriculum linked to the crop phenology.

So far, FFS programmes on IPM as well as other topics such as soil, water and livestock management have been implemented in 74 countries (Braun et al., 2006).

## **2. Capacity development intervention**

<sup>2</sup> These are government officials who organize a wide range of communication and learning activities for rural people.

<sup>3</sup> The ADB/CABI (1993 - 96) and UNDP (1994 - 1999) projects, in collaboration with the GoI, conducted TOTs and produced about 270 master trainers in cotton IPM.

<sup>4</sup> "GCP/RAS/164/EC *Integrated Pest Management for Cotton in Asia (1999-2004)*". India was one out of six Asian countries (Bangladesh, China, India, Pakistan, Philippines and Vietnam) engaged in this programme.

Capacity development was centred on a mix of modalities, i.e. **training** (facilitators’ training-ToF; and farmers’ training- Farmer Field Schools); **field exchanges and study tours**; **farmers’ clubs and alumni groups**; and **national workshops and meetings for policy-makers**.

## 2.1 Training

### *Training of facilitators*

Training of facilitators was conducted by the project management team in collaboration with national staff from the Department of Agriculture trained in previous IPM programme for the whole crop season each year for 25-30 participants.

The training was designed to prepare mainly government extension staff, but also NGO staff and scientists, to develop their technical skills in IPM, enhance participatory training skills, and improve their management and experimental capabilities. Upon completion of the training, the participants could facilitate the FFS.

In 1999, a **curriculum development workshop** was held at the start of the programme. There were 25 participants, including national and international IPM experts, scientists, experienced facilitators and experts in participatory approaches. The workshop output was a curriculum with 20 weekly training schedules incorporating field experiments, field exercises and the topics for participatory discussion. The ToF and FFS curricula were revised on a regular basis, every crop season, based on the experience gained, on the local needs and on the recommendations of the yearly workshop organized by the programme. This helped to maintain the quality of training.

<b>Box 2. Example of ToF weekly schedule</b>					
DAY	08.30 – 13.00	13.00-14.00	14.00-14.30	14.30-16.45	16.45-17.00
MON	Crop physiology/Special topics	L U N C H	T e a m b u i l d i n g e x e r c i s e s	Non-formal education	D A Y ’ S E V A L U A T I O N
TUE	Insect zoo/Participatory Action Research (PAR)			Insect zoo/PAR	
WED	AESA			Participatory discussion by expert	
THU	AESA/PAR follow-up Special topics			Non-formal education Preparation for FFS	
FRI	Farmer Field School (in the villages)			Feedback from FFS	
SAT	Special topics			Planning for next week’s activities	

ToF participants were selected by FAO in collaboration with the state departments of agriculture and other national institutions. The aim was to create a gender-balanced<sup>5</sup> group of young, creative and motivated agents of change who could promote a paradigm shift in the approach to rural development from top-down technology transfer to farmers’ capacity building.

The content of the training consisted of ecosystem analysis, crop management, decision making, participatory processes, organizational planning, group dynamics and health hazards of pesticide exposure. It was a learning-by-doing approach: during the ToF course, participants directly facilitated the FFS for a full season. When the participants graduated, they would run a FFS under the supervision of expert facilitators at the state or provincial level, a mechanism that ensured on-the-job performance assessment and direct provision of guidance.

<sup>5</sup> The participation of women increased over the years to reach 30 percent in 2004.

New facilitators were selected every year from the ToF graduates. At the start of every ToF, two-week regular refresher trainings were introduced to strengthen the individual capacities of the new ToF and update the experienced ones with new developments in cotton IPM.

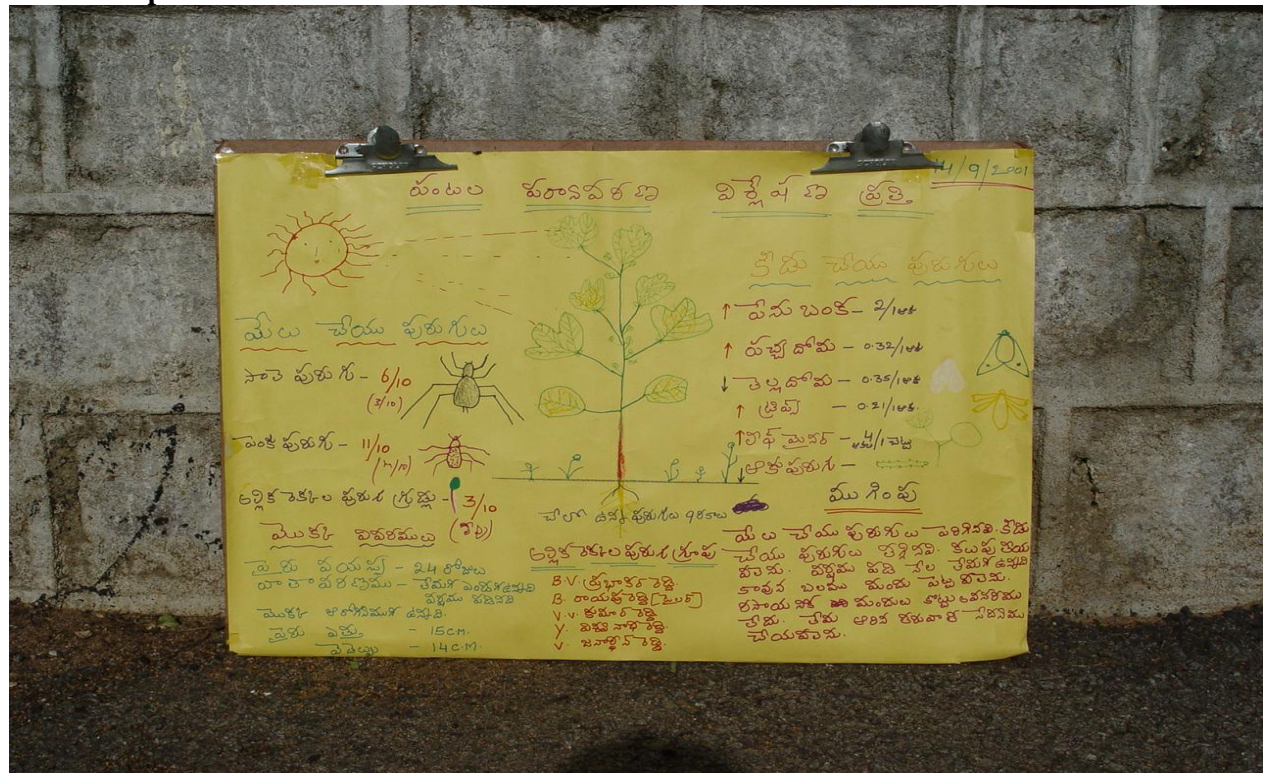
**Training of farmers**

The FFS approach was used to educate farmers about IPM through a full crop season.

The school was organized in the fields of the participating farmers. About 25-30 participants met for half a day, each week for six months, from before planting until the harvest.

The core exercise of FFS is the agro-ecosystem analysis (AESA). At each FFS meeting, the members were divided into small groups to make observations of the crop, field and environmental conditions of two study plots: an IPM plot and a Farmer Practice plot. These observations were recorded in drawings (Box 3), discussed, compared and interpreted by the group, with assistance from the IPM facilitators. The aim was to help farmers become better decision-makers and encourage learning through discovery.

**Box 3- Sample AESA chart**



FFS curriculum development and fine-tuning was undertaken as a joint effort of farmers, IPM facilitators, and experts who collaborated on field experiments linked to pilot FFSs to reflect locally-specific agronomic issues.

**Box 4. Farmer-to-Farmer Schools (F2FSs)**

In India, it was possible to introduce an FFS scale-up model based on the introduction of farmer-to-farmer training. F2FSs were conducted by FFS alumni farmers, who had demonstrated a particular skill set and interest. Selected farmer facilitators received complementary training in facilitation and communication

skills, as well as in technical aspects, before organising their own FFS. F2FSs were organised in the villages of the facilitators using the same methodology as in regular FFSs. Farmer facilitators were backstopped by experienced facilitators on a need base.

## **2.2 Field exchanges and study tours**

A number of activities such as exposure visits, field days and farmer gatherings were conducted to enrich the learning of participants, facilitate exchange of knowledge between farmers and support the dissemination of ecological agricultural practices.

Study tours to research institutes such as the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and Central Integrated Pest Management Centre (CIMPC) were organized during ToFs to expose participants to the latest research findings and the development activities concerned with IPM.

Two farmers' congresses (700-800 farmers) were organized by the state departments in collaboration with the FFS groups to invite farmers from neighbouring villages to visit IPM plots and participate in an introductory session on the performance of field agro-ecological analysis (AESA).

## **2.3 Farmers' clubs and alumni groups**

The formation of FFS farmers' associations and clubs was encouraged. These registered groups organised activities related to IPM from production of neem-based biopesticides to field research trials. Some were active in social works to support the more vulnerable farmers in the village. The project designed a system for FFS facilitators/monitors to follow up alumni groups and help them continue IPM activities. In 2003, this system was used to support 86 active FFS alumni groups. The state governments have adopted this system, and in 2004 they extended financial and technical support to 379 alumni groups (176 in Karnataka, 90 in Maharashtra and 113 in Andhra Pradesh).

## **2.4 National workshops and meetings for policy-makers**

Workshops, seminars and national- and international-level meetings were held to sensitize policy-makers on the need to adopt educational programmes that would build farmers' knowledge and skills to restore the economic viability and ecological sustainability of cotton production.

In every ToF, one- or two-day orientation programmes were organized for officials involved in agricultural extension activities. These programmes were especially intended to ensure that FFS facilitators received solid support from their official supervisors in charge of the programmes.

During the project, two national-level meetings were organized for policy-makers from central and state governments to review project progress, develop an action plan, streamline GoI funds for IPM work and have a final meeting to share achievements.

## **3. Results**

From 2000 to 2004, the FFS programme for IPM cotton in Asia created a cadre of IPM facilitators. Extension services, NGOs and several research institutions trained more than 50,000 farmers in the states involved and developed models for possible scaling-up.

Strengthening farmer knowledge and skills in ecological field management had an important impact in areas where the projects operated. Specifically, the use of highly toxic pesticides was



drastically reduced, in some cases to a minimum amount of 250 ml active ingredient per hectare (a.i./ha) per season, from above 1000 ml a.i./ha. The reduction was obtained as a result of increased farmer understanding of and confidence in the use of biological control alternatives. Farmers' exposure to toxic pesticides, in particular to the widely used organophosphates, was thereby minimized, resulting positive effects on human health. For instance, the incidence of acute pesticide poisoning among field workers was halved at some of the project sites. Environmental risks on field biodiversity were also contained.

Moreover, through integrated production management, farmers obtained higher, more stable yield levels.

The number of facilitators directly trained under the supervision of the cotton IPM project, including farmer facilitators at the closure of the project, left the states with the capacity to conduct about 2,000 FFSs a year to train 100,000 farmers directly.

During the last two years of FAO programme implementation, assistance was extended to state departments of agriculture to organize state-funded ToFs and to mainstream the FFS approach into regular governmental schemes. The central government gave permission to state governments to divert funds allocated for IPM demonstrations under Technology Mission in Cotton<sup>6</sup> in order to organize project model ToFs and FFSs. The Government of Maharashtra used this flexibility clause and organized 143 FFSs in chickpea in 2003, andn three ToFs and 248 FFSs/F2FSs in 2004. In addition, 90 FFS alumni groups were supported with these funds.

Under the State Work Plan Schemes, the Governments of Karnataka and Andhra Pradesh committed US \$492,000<sup>7</sup> for conducting ToFs, FFSs, F2FSs and for other IPM training activities in their States.

After 2004, the state of Andhra Pradesh renamed the FFS approach using the local name 'Polam Badi' and adopted it as the official approach to train farmers on sustainable field management practices. According to the official reports, during 2005-2007 6,947 Polam-badies were organized, and in 2006 alone 1,966 farmers served as facilitators in 983 villages.

In 2007, three years after the closure of the FAO programme, efforts to institutionalize the programme have been sustained in national programmes. For example, the guidelines and budget for the implementation of the Technology Mission in Cotton still include a provision for the organization of FFSs during 2005-06 and 2006-07.

#### **4. Critical factors leading to successful capacity development practices**

The factors which contributed to the success of the FFS programme in India are the following:

##### *Commitment and interest of the Indian government in piloting and scaling-up the FFS model*

Since the 1990s, the GoI (national and/or state level) has shown willingness and commitment to piloting new approaches and to enhancing capacities of its extension service to meet farmers' needs. Thus, for about ten years, in partnership with FAO, the government introduced the FFS approach to strengthen institutional and individual capacities for the ecological management of fields in various States of India.

The programme contributed to the reorientation of the agricultural extension services and policies in the country. In 2007, the National Policy for Farmers was approved and represented an

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<sup>6</sup> Technology Mission in Cotton (TMC) was launched in February 2000 by the Government of India to improve the yield and quality of cotton, and increase the income of the cotton growers by reducing the cost of cultivation. The scheme extends in the XI National Plan for two years up to 2009 to accomplish the target.

<sup>7</sup> This amount excludes facilitators' salary.

important step forward, as it officially acknowledged the need to invest in farmers' education and in innovation.

#### *Stable/strategic allocation of resources to ensure quality training and skilled facilitators*

As previously mentioned, since 2002 the central government has given instructions to certain states to use funds from the Technology Mission in Cotton<sup>8</sup> national programme to conduct ToFs, FFSs, F2FSs and other IPM training activities. The states of Maharashtra, Karnataka, and Andhra Pradesh acted accordingly. In Andhra Pradesh, FFS became the official approach to train farmers in improved management practices.

#### *Pedagogical design and adequate matching of training length to content, and to the capacity development goals of individuals*

The main modality of intervention was the training of individuals and institutions (farmers, extension service).

The pedagogic approach was particularly effective as it put the learner at the centre of the process and ensured adequate matching of training length to content and to individual capacity development goals. In fact, the farmers as well as the extension agents were put at the centre of the learning experience. They were actively engaged in the learning process, which was embedded in a biological cycle (a cropping season, one year). This approach meant that participants could gain practical experience and build confidence, refining their analytical and decision-making skills over a significant period of time.

#### *Mix of modalities of intervention to sensitize policy makers*

Moreover, international meetings, workshops and seminars, were organised as complementary instruments to sensitise policy-makers on the need to adopt educational programmes enhancing farmers' knowledge.

#### *Quality monitoring, backstopping and follow-up activities*

The intervention also established a monitoring system to ensure quality in ToF and FFS. Expert facilitators were assigned to work closely with counterpart government officials to give support to the ToF. All three state governments appointed one officer each who exclusively provided support to ToF coordinators and assisted the programme expert in monitoring the quality of FFSs. For this purpose, periodic review workshops were also undertaken. The programme demonstrated that facilitating science with farmers through discovery learning requires experienced facilitators. Therefore, the success of the intervention was also due to the choice of good facilitators, highly committed to the field school, and able to animate and stimulate attendance.

#### *FFS approach supporting collective action and empowerment*

In addition, the community approach used in FFS supported group formation and empowerment. Many farmers' clubs generated income through membership fees, and the production and sale of bio-pesticides. Alumni clubs embarked on socio-cultural activities for the benefit of the village such as income generation for single women.

#### *FFS approach facilitating interactions between different stakeholders*

Finally, the FFS programme has also facilitated interactions between scientific and research institutions (e.g. Indian Council of Agricultural Research) universities, and state and central policy-makers from the Ministry of Agriculture. These interactions have created effective partnerships for integrated strategies on rural development.

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<sup>8</sup> Refer to footnote 5.

## 5. Lessons learned and opportunities

FFSs have been used as a capacity development approach in India, both by local governments and by other FAO projects, since the end of the FAO-EU IPM Cotton Programme in Asia. However, the institutionalization process is facing challenges in maintaining the quality of training while expanding and extending the approach on a large-scale.

Among the practical constraints to scaling up the adoption of FFS have been the delayed releases of funds to support FFSs, the lack of coordination between stakeholders and the overload that FFS organization places on local extension officers. It seems that a higher integration of the rural development strategies could mitigate some of these problems.

To date, FFS programmes in India have focused on increasing farm productivity and reducing the cost of production. The present food price crisis is showing the need to support farmers beyond the farm gate to escape poverty. Improving agriculture productivity and resilience has not offered a way out of a subsistence livelihood for the majority of the poorest farmers. Low farm-gate prices and competition from large-scale producers threaten to keep small and marginal farmers trapped in poverty. The relaxation of the post-independence political instruments regulating domestic trade of national commodities has facilitated the entry of larger private companies into agri-businesses, which have rapidly established vegetable and cereal retail chains across the nation. However, small farmers are not directly linked to the market and are therefore unable to derive financial benefits from improved marketing arrangements.

New tools and specific FFS components are needed to address these issues. FFS programmes could be used explicitly to strengthen farmers' capacity to organize them to meet market demand and should support pro-poor marketing approaches. FFSs should build more organizational capacity to enable farmers to add value to agro-products for local markets. They should also serve as platforms to link farmers' organizations to big retail chains. In some limited areas and for specialized crops, they could also provide access to export opportunities.

An opportunity emerges: growing environmental concern has set an increasing domestic and global demand for 'clean' products. To date, IPM products, such as cotton, have been commercialized in local markets without any premium being paid. FFS could support the federations of small farmers' organizations to develop niche products and microenterprises to capture this additional value.

## 6. Further reading and information

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