

# Farmer field schools deliver results in Iran

*Farmer field schools provide a ground upwards approach to training farmers in integrated pest management. Hossein Heidari, Alfredo Impiglia, Laleh Daraie and Fatemeh Mirzaie describe initiatives in Iran which have successfully reduced pesticide use, increased crop yields and improved the local environment.*

About 26,000 tonnes of pesticides including more than 140 different active ingredients are distributed to farmers in Iran every year. Other active ingredients are imported illegally some of which are banned in Iran including Persistent Organic Pollutants (POPs) which are carcinogenic and extremely harmful to humans and the environment. In provinces, where farming is most intensive, pesticides are applied at dangerously high levels. About 60% of the total pesticides applied in Iran, for example, are used in three provinces around the Caspian Sea and 40% of the total are used in Mazandaran province. In addition, some fruit and vegetables, in particular summer crops and greenhouse crops, may be sprayed as often as 6-12 times per season and almost 30 times per season in the Jirouft region (south east of Iran).

Since 1994, the Government has started a number of programmes to reduce pesticide use. However, most of these initiatives did not fully incorporate bottom-up participatory approaches and the relevant stakeholders failed to establish sustainable plant management systems at the farm level. The initiatives have not been sustained.

The Farmer Field School (FFS) approach was first adopted in Iran in 1999 as part of a pistachio integrated pest management (IPM) project in Semnan Province [PN59, pp12-14]. Two seasons of FFS demonstrated that the approach could be effective in empowering farmers to tackle many of their problems, reduce production costs and increase income. Visits and evaluation missions by representatives of various government agencies promoted the idea that this approach could be expanded as an effective participatory research and extension strategy to other regions and crops, such as wheat and rice.

## Changing rice production

In 2002, the United Nations Development Programme (UNDP) Global Environment Facility's Small Grants Programme (GEF/SGP) launched a project in Sooteh Village, Mazandaran Province called 'Farmers' Empowerment towards Sustainable Agro-ecosystem Management in Rice Fields'. The project was implemented through the Institute for Green Rural Advancement (IGRA), a Non-Government Organization (NGO) active in the area of

sustainable agricultural development, and with the active collaboration of all relevant local and national institutions. Through FFSs the pilot project empowers farmers to adopt alternative crop management techniques such as participatory IPM which works to eliminate excessive use of toxic pesticides.

FFS projects will provide a range of benefits to farmers and the environment. The Siberian crane, the third rarest species of crane, over-winters in the nearby seasonal wetlands in the Caspian Sea area. The project has contributed to its conservation by introducing eco-agricultural practices to the area and reducing the quantity of dangerous pesticides entering the environment. Local livelihoods partly depend on catching migratory birds, so the project also works alongside a group of participating farmers from Sooteh village training the local people to adopt alternative livelihoods, such as mixed farming of duck/rice and fish/rice. Ducks not only provide extra income but also help to control snails in paddies. This was done in tandem to promoting organic production and gradually eliminating the use of pesticides by farmers, since chemical pollution of water in paddy farms is a limiting factor in rearing fowl.

## Encouraging results

Three years have now passed since this UNDP GEF/SGP-backed project started and its achievements are now evident. Initially a group of 26 farmers were trained. The trained farmers have passed their knowledge on to around 1,600 additional farmers. According to the Iranian Research Institute for Plant Protection (PPDRI), crop production on the pilot site rose by about 17-25% while pesticide application decreased by 60-80%. Fertilizer use was cut by 50% (replaced by compost) and IPM-trained farmers saved an average of \$200 per hectare per season, while increasing their yields. Savings have mainly been from decreased seed and pesticide costs; all farmers in the group and the additional 1,600 farmers have decreased seed usage by 60%. Farmers not involved in the project apply pesticides four times to a normal rice crop and an additional five times if they engage in Raton cropping<sup>1</sup>. Therefore, if a farmer grows rice and practices Raton cropping he/she may apply pesticides nine times each year. By contrast



Siberian crane

Photo: Hossein Heidari

most farmers in the project only apply pesticide twice and some have eliminated pesticides completely.

Not all farms under rice cultivation are suitable for the duck/rice system. Ducks in fields neighbouring forest are vulnerable to wild animals and these fields require much more care. But, farmers able to practice the duck/rice system can earn US\$400 per hectare. Income from the fish/rice system is similar to that from the duck/rice system.

More importantly, farmers produced a pesticide-free crop. Rice was tested at the Iranian Research Institute for Plant Protection. After the first year only one pesticide (diazinon) was detected at a concentration of 0.05 ppm. In the second year the concentration of diazinon dropped to 0.005 ppm (ten times lower than the 1992 Codex MRL standard). After the third season of FFS no residues were detected.

After the first season the farmers' group started to market their IPM produce to consumers based on its purity and safety. The rice was sold in 10 kg sacks and distributed to 40 consumers. These were mostly stakeholders in the project and other educated people living in the capital aware of the benefits of IPM products. In the second year, each of these consumers ordered more rice for themselves and their friends. The demand increases each year. In the third year, 25 tonnes of IPM rice was harvested and sold to consumers, locally and nationally. Iran has no organic standard legislation, body or labeling system, and so, for now the marketing is based on trust.

## Increased awareness of IPM

SGP has financed a small project on marketing with local farmers directly. Middlemen are omitted and both farmers and consumers benefit. Farmer groups deposit 50% of their annual income in a local finance system to provide farmer loans (without interest) to prepare land for safe crop practices. People are usually aware of pesticide hazards, but they do not know how to produce safe foods. Farmers use a label on their crop to inform consumers about pesticide hazards, which is increasing demand for safe food among co-ops and health conscious consumers. The



A farmers' group analyses data collected in the field, Jiroft, South Iran. Photo: Hossein Heidari

FAO Regional IPM project also recently approved a survey on organic aimed at improving understanding among policy makers, decision makers and private sectors.

The success of the FFS in Sooteh demonstrates that IPM training can be effective when it is not simply packaged as a top-down extension message. Although covering a relatively small area, the project has wider significance by demonstrating alternative solutions to a number of critical problems facing agriculture and the environment in Iran and its neighbouring countries.

Realizing the benefits, farmers in several neighbouring villages have been inspired to adopt the FFS approach. At the national level, the project has succeeded in bringing together the government, NGOs and local farmers.

While the initial emphasis of the UNDP GEF/SGP-backed IPM Project was on rice, it supports the extension of the approach to other crops. IPM training activities and FFS have now been extended to vegetables like cucumbers and selected fruits like dates, which are more prone to absorbing pesticides. FFS are now part of the national IPM programme. Since 2007, the Sooteh pilot site has been selected as a demonstration site for transfer of experience and knowledge to similar initiatives across the country.

The project has also inspired a number of other joint projects in similar fields. A recent example is that of the UNDP/GEF Caspian Environment Programme project, 'Sustainable agro-ecosystem management through participatory integrated crop production and protection of rice fields', launched in 2007 in Amol, Mazandaran province. Another example is two sites implemented in Ramsar sites<sup>2</sup> through the Siberian Crane Fund of the United Nations Environment Programme (UNEP) in 2004-5, with direct involvement of the Sooteh project.

### Participatory research

The duck/rice system in Sooteh has been established using bottom-up participatory methods. In paddy fields, weeds compete with crops. In search of alternatives to syn-

thetic pesticides and expensive mechanical options the group of farmers in Sooteh tried the traditional intercropping of rice and ducks. Ducks feed on weeds but not rice and successfully control all weeds, even *Azolla* which grows aggressively. Two or three year old ducks are used, and 300 to 400 per hectare of these, depending on weed population, are released in paddy fields. Duck is the main source of protein for people on the Caspian coast and excess can be sold on the local market. Recently the threat of bird flu has limited this system and so farmers are also working on a fish/rice system. The farmers analyze different parts of the systems each week. The plot of intercropped fish/rice was evaluated continuously by the group to determine the fish growth rate. About 500 kg fish are harvested per hectare, which provides a welcome additional income for farmers as well as boosting land fertility and controlling pests.

The method of learning used in FFS was taken by the villagers and used to promote education in other areas such as protection of domestic poultry against diseases (carried out by women), producing mushrooms, reproduction of local poultry artificially by means of incubators and producing compost out of *Azolla* (carried out by village youth). Other farmers in the local community and elsewhere practice FFS methods believing that it helps not only to reduce expenses and increase incomes, but also to protect their environment and produce pesticide-free products.

### The FAO Regional IPM project

The first impetus for IPM/FFS came from environmental agencies such as UNDP/GEF/SGP and later from UNEP/GEF. More consolidated efforts were initiated in 2004 by the United Nations Food and Agriculture Organisation (FAO) with Italian contribution from the Food Safety and Food Security Programme. The project was approved for six countries; Iran, Egypt, Palestine, Syria, Lebanon and Jordan. Each country chose two horticultural crops: Iran chose grape and cucumber.

During two years of the project, the number of pesticide applications reduced from 30 to two in the case of greenhouse cucumber and in some cases where FFS was strongly implemented, it was reduced to zero. In the Jirouf region (South East Iran), where 4,000 ha are under greenhouse cucumber, 30% of the production costs are for the purchase of pesticides. In some cases, some farmers spray US\$12,000 per farm of different pesticides to protect their crops from pest damage. FFS was able to decrease production costs, bringing huge benefits for farmers within a single season.

### Plant-based pesticides

One technique promoted under IPM is the replacement of synthetic pesticides with pesticides derived from plants. A garlic-based pesticide was used successfully to control sucking insects and mite in greenhouses

under the FAO Regional IPM (RIPM) project in Varamin and then in Jiroft. Galbanum is a herb farmers historically used against soil borne pests such as *Polyphylla olivieri*. Recently one of the facilitators in Tehran introduced it for controlling pests in greenhouses. A company has recently built a factory to produce plant-based pesticides and has sent samples to the authorities for registration. These are under consideration. Without subsidy the price of these pesticides is similar to that of synthetic ones. However, demand for these products is increasing from the Varamin, Semnan and Jiroft regions.

Farmers working with facilitators organizing FFS sites covered by the FAO Regional IPM project are now aware of pesticide hazards and looking for alternatives. A new institute in Jiroft established for IPM/FFS provides information to farmers on non-pesticide pest control methods. The institute is the result of increasing demand from farmers for safe methods of pest control in green houses.

### Pesticide contamination

Fourteen kinds of pesticides have been found in Sefid Roud in Gilan province, the main river for fisheries in the country. All pesticides were found at higher than the level allowed by the US Environmental Protection Agency standard in water and some of them were found at more than 100 times this standard. Levels of diazinon and endosulfan residues found in cucumber in Buyer-Ahmadi province exceeded Codex standards. One investigation carried out in Mazandaran province on rice estimated that diazinon concentrations were five times higher than the MRL. Meanwhile rice produced in this area by the UNDP/GEF/SGP project contained zero residues<sup>3</sup>.

### Obsolete pesticides in Iran

Based on information from the Office of Environment and Sustainable Agriculture (OESA), almost 62 tonnes of different types of POPs pesticides are held in government stores around the country. Much of this is stored in poor conditions. Eighteen tonnes are in the central store of the Plant Protection Organization<sup>4</sup>. In addition 2,400 tons of carbamates and organophosphate pesticides are unusable and obsolete. 90% of these pesticides were obtained using official subsidies. These subsidies have since been removed. One estimate calculated that 60,000-70,000 tonnes soil have been contaminated by POPs pesticides at storage sites. There are around 2,400 pesticide shops in the country, almost half of which are illegal. These pesticide shops are the main place for trading banned pesticides and the reason why DDT residues have been found in citrus along the Caspian coast at around 10 parts per million.

### Benefits

IPM helps farmers to understand and validate both scientific knowledge and indigenous knowledge and practices. Their under-

standing of farming systems increases, allowing them to find the best local solutions to pest problems, and to reduce pesticide use.

Mr Aghaee, a farmer in Urmieh (North West Iran) commented that despite 16 years of working on grapes he only understood the biology of *Lobesia* after attending the FFS. He now monitors populations and tries to find alternatives to pesticides to manage this pest.

In Damghan the FFSs work on pistachio/grape systems, and on cucumber. For pistachio the IPM trained farmers report a reduction in pesticide use from six to two or three applications per season, and from 10 to one in cucumber. In Sharoud pesticide use on grapes was reduced from four applications to one after IPM training.

## Marketing IPM produce

One issue that was raised by all FFS groups is marketing. IPM farmers can reduce their use of pesticides (sometimes to zero) and some other chemicals such as fertilizer. This contributes to producing food more likely to meet food safety standards. Some farmers produce organic food, although not certified as such. However, the market structure at present provides no incentive to farmers to produce better quality and safer food. Currently, IPM products are mixed with other products produced with more chemicals. Getting access to markets – domestic and international – that reward better agricultural practices is an issue. IPM farmers who participated in an agricultural fair received acknowledgment for producing high quality products meeting certain standards like low pesticide residues (pistachio from Damghan and grape from Urmieh). Presently no certification systems exist for IPM or organic products. The project is cur-

rently implementing an initial study on marketing that will help to clarify how to improve marketing. It will be finalized in the coming months.

## Moving beyond IPM and FFS

At this point 179 FFSs have been established in Iran by different projects (Table 1). FAO implemented projects have trained facilitators for the government FFS programme. For example, in Jiroft three FFSs on citrus have been approved and are led by facilitators from the RIPM project.

Experiences in Iran with FFS date from before the start of the regional IPM project in the Near East. In the late 1990s IGRA (Institute for Green Rural Advancement) worked with FAO's Global IPM Facility introducing the FFS approach in Iran. IGRA is the leading NGO in Iran in introducing and expanding FFS, and is also a key player in the regional IPM project in Iran. In Damghan IGRA organized a FFS on pistachio in 2002, and this group forms the backbone of the expanded IPM-FFS activities that started in the area under the regional project, with over 500 farmers involved. A group of over 50 farmers created a Community Based Organisation (CBO) that is now implementing FFS activities under a Letter of Agreement with the project. The situation is similar in Shahroud, where a local CBO emerging from IGRA's field activities is now implementing the FFS activities. These organizations are looking at broader rural development issues (such as getting better access to markets). They interact with farmers and other stakeholders – including provincial government offices – and can play an important role in articulating the services that farmer communities need for further development. The FFSs play a role in motivating such CBOs.



A facilitator collects pests and natural enemies during a Training of Trainers, Jiroft, South Iran.

Photo: Hossein Heidari

The current curriculum of the FFS is not limited to IPM but includes a number of other topics such as soil and water management. During discussions with different FFS groups farmers also indicated other advantages of the FFS for them and their communities. These include an increased self-confidence, better farm management, research that is based on farmers' needs, environmental issues, and better relations with other farmers. For facilitators the FFS has provided a means to develop a space for discussion and interaction, optimizing the rich and valuable knowledge and experiences that farmers have. Women's participation as farmers and facilitators has increased and as a result of the FAO project more women are demanding to become involved. In cucumber FFS in Damghan and grape FFS in Western Azerbaijan, all the participants are women. More than 60% of all the facilitators in the Regional IPM project are women and this figure is increasing rapidly.

In the future FFS farmers would like to see more schools organized to ensure that new technologies are adopted in the field. They would like other crops to be included in FFSs and improvements in marketing through increased public awareness of IPM products. Some groups intend to establish direct links with consumers.

1. In Raton cropping rice is regrown after the first harvest allowing attack by a second generation of pests and usually requiring more pesticide use.
2. The Ramsar Convention identifies important wetland areas needing protection.
3. Iranian Research Institute for Plant Protection-IRIPP, 12 September, 2006.
4. POPs Pesticides Inventory and Sampling Report in Islamic Republic of Iran. UNDP/GEF/Department of Environment/Iranian Institute Research for Plant Protection, 2006.

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**Table 1. Overview of FFS projects in Iran**

Season	Crop	Number of FFS	Number of participants	Support
2004/05	grape	12	94	FAO
	cucumber	17	172	FAO
	grape/pistachio	8	113	FAO
	rice	6	100	GEF/SGP
subtotal		43	479	
2005/06	grape	13	94	FAO
	cucumber	19	221	FAO
	grape/pistachio	8	113	FAO
	rice	5	75	UNDP/GEF/SGP
	date palm	5	52	UNDP/GEF/SGP
subtotal		50	555	
2006/07	grape	12	174	FAO
	cucumber	40	400	FAO
	apple	8	138	FAO
	rice	20	300	UNDP/GEF
	wheat	1	15	SGP+UNDP/CEP
	vegetable	3	45	UNDP/GEF/SGP
	apple/cherry	2	35	UNDP/GEF/SGP
	FAO			FAO
subtotal		86	1107	
total		179	2441	