The Role of Farmers' Field Schools in IPM Implementation

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Abstract

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Introduction of Farmers' Field Schools (FFS) in 1993 and Rural Women Schools (RWS) in 1995 by the FAO/ARC IPM project as a new model of extension of new production and Integrated Pest Management (IPM) options is presently widely accepted by policy makers, federal and state ministries of agriculture, large scheme managers, researchers and farmers. The FFS/RWS approach is already used as a standard extension methodology in the Gezira and Rahad scheme; Gezira, Khartoum and Sennar states. First FFS/RWS has been also established in El Obeid area for rainfed agriculture. The FFS/RWS activities include weekly meetings in the field throughout the whole growing season with a group of 25 - 30 farmers. In this approach, on-farm research is integrated with extension; farmers are trained in weekly training sessions and by validating technical IPM options for pest control and improved cultural practices at farm level. The new dimension of FFS/RWS approach includes following new interactions between farmers/extensionists/researchers/ managers/policy makers such as: (a) Training the farmers and preparing local extensionists in participatory approach; (b) Exposing scientists to the farmers problems, needs and constrains of production; (c) Training the conventional extensionists and increase their interactions with farmers; (d) Act as a focal field points, where farmers meet with researchers and extensionists; (e) Raise the awareness of farmers in environmental and food security issues; (f) Improve the farmers interactions with researchers and the government extension and (g) The FFS provides a sustainable research extension system because the significant number of farmers graduated from the school can perform a role of local extensionists.

Introduction

Integrated Pest Management (IPM) has been advocated as the preferred pest control strategy since the mid 1960s. It can be defined as the careful integration of a number of available pest control techniques that discourage the development of pest problems and keep pesticides and other interventions to levels that are economically justified and safe for human health and environment. IPM emphasises the growth of a healthy crop under the least possible disruption of agro-ecosystems, thereby encouraging natural pest control mechanisms (9, 12). Integrated Pest Management (IPM) adds three dimensions to pest control:

(1) Ecological sustainability, as it relies primarily on environment friendly approaches, including the use of pest resistant varieties, actions of natural enemies and cultural control;
(2) Social stability, because it is institutionalised at the level of the farming community and the local government; and
(3) Economic sustainability, as it reduces farmers' dependence on procured inputs (12).

Successful IPM implementation has three components: applicable research results, a policy change away from pesticide subsidies, and a participatory farmer training programme.

Constrains in IPM adoption by farmers

The problem with the implementation of IPM principles and options was identified by a number of authors as a major bottleneck limiting the progress of IPM world-wide, both in developing as in developed countries. It was noticed that fulfilling the new aims of IPM presents three particular difficulties to extension workers. First, decision tools which will improve farm level pest management are complex, often requiring new cognitive skills as well as new factual and procedural knowledge. Threshold-based spraying, for example, requires a basic ability to work out projected costs and returns, which in turn demands an understanding of the economics of crop production beyond that which a farmer has needed previously. Without this, no amount of teaching the procedures of sampling and pest recognition will help the farmer make appropriate decisions. In the case of still more complex practices, the difficulty is multiplied (6).

Second, extension workers are often faced with having to contradict earlier advice, as with a move from calendar to threshold-based spraying, or with the removal of a particular product from the list of recommended or permitted pest control chemicals. This can have a damaging effect on the credibility of extension workers.

Third, effective pest management, especially in smallholder agriculture, may require collective activity. Most agricultural extension focuses on individual holdings, with extension workers encouraging farmers to adopt changes on their own farms which will benefit them whatever their neighbours choose to do. However, many pests do not conveniently confine their attention to a single holding. Extension workers therefore find themselves trying to promote collective decision-making and action.

These three difficulties highlight the fact that extension for pest management cannot be reduced to the provision of information and the encouragement of individual farmers to adopt new practices.

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Development of IPM in the Sudan

The situation of IPM implementation in the Sudan did not differ from the rest of the world. The first work on IPM principles was initiated by the FAO/ARC IPM project in 1979 on cotton in the Sudan. The project entitled Development and Application of Integrated Pest Control in Cotton and Rotation Food Crops was signed on 28th of March 1979, a first phase of three years. Food and Agriculture Organization of the United Nation was designated as the executing agency, and the Ministry of Agriculture through the Agricultural Research Corporation (ARC) as the implementing agency. The four phases of the IPM project were executed between 1979 - 1996.

During the first three phases of the IPM project in the Sudan the main thrust was to develop and introduce IPM in cotton, particularly through the use of raised ETLs for the four main insect pests. This approach did not involve major extension activities since pest monitoring, decision making and pest control operations were executed by the schemes (Gezira and Rahad) and not by farmers. The same could be said for wheat IPM. However, with the shift in the fourth project phase from cotton and wheat to vegetable IPM in 1993, the project had to change its approach because in vegetable crops, all pest control operations are carried out by farmers. This means that farmers had to be trained in pest and natural enemy recognition and monitoring, understanding of pest damage-crop loss relationships, and pest control operations including the use of pesticides. Moreover, very few technical options were available for vegetable IPM. This situation has obligated the project to develop a new strategy for IPM development on vegetables (10).

One of the major problems of implementing IPM strategies in Africa,common with other regions, is the functionally separate structure of research and extension service. The top-down transmission of research results, first to extension staff and then to the farmers, is the norm. Considering the current availability of traditional pest control methodologies at the farmers level, this approach obviously needs to be modified. What is needed is a multi-disciplinary mechanism that encompasses full farmers involvement and recognises their roles as producers and developers with the farmers participating in the technical evaluation of the IPM recommendations (2).

The FAO/ARC IPM project in the Sudan has succeeded in directing research activities towards on-farm research and farmers involvement in developing and validation of IPM on vegetables, wheat and cotton. Much emphasis was given to the essential close co-operation between research and extension. Extensionists were involved from beginning in the project developments, especially on-farm research and participatory training of farmers; and not only in the end-users phase (4). Farmers' Field Schools (FFS) and Rural Women Schools (RWS) were established, validated and implemented on a large scale in central Sudan (3).

Establishment of farmers' field schools

It is now well known that the traditional extension methods as classroom training or training and visit systems in general have proven not to be very effective in implementing IPM programmes. This type of training has as objective to teach the farmer a number of technologies whose interrelationship is often not clear. Experience in south-eastern Asia has shown that by providing the farmers with necessary knowledge and understanding of the local agroecosystem that enables them to analyse options and take their own decisions instead of receiving packages of technology for implementation has a much better and lasting impact (7, 11). Training of farmer groups in real fields throughout a season using non-formal training methods has proved to be the most effective to reach this objective (10).

Implementation of the participatory approach needs different kinds of field staff than the traditional extentionists. The group promoter is a key agent in any participatory project; his or her task is to facilitate the development of the groups' capacity to organise and manage their activities. Unlike the "traditional" extensionists, the group promoters do not see their "clients" as passive recipients of new technical knowledge: their aim is to work side by side with the poor, building up their confidence in their own abilities and promoting their self-reliance. Since this must be done without creating patron-client dependencies.The group promoter's function is essentially that of an intermediary, with three basic roles:

(i) group adviser, strengthening the groups' leadership, organisational and planning capacity;
(ii) participatory trainer, teaching groups basic technical and problem-solving skills; and
(iii) "link person" facilitating communication between the groups and government and NGO development services (5)

The first eight model FFS were established in the 1993/94 season in the Gezira and Rahad schemes and Gezira state. In the 1994/95 fourteen FFS with 258 farmers were organised in the Khartoum and Sennar state in addition to Gezira and Rahad schemes and the Gezira state. Twenty six FFS (including 5 Rural Women Schools) were established in the 1995/96 season. Recently 145 FFS and 18 RWS were operating in the 1996/97 season in central Sudan. The Gezira scheme's extension department has been requested by Prof. Fatehi Mohamed Khalifa, Managing Director, to increase number of FFS to 113, one school per each block of the scheme. The scheme management is planning further increase of FFS to 300 in the 1997/98 and 452 in the 1998/99 growing season. The Gezira scheme has also established its own FFS/RWS Co-ordinating Committee with 14 members; pays ARC researchers' honorariums for training and technical field visits to FFS/RWS and for preparation of training materials.

The Rahad scheme has established 8 FFS, Gezira state - 8 FFS and 12 RWS in the 1996/97 season. Additional FFS were organised in Sennar state (4) and Abu Naama area (2). Both Sennar and Abu Naama were involved in the FAO/ARC IPM project activities since 1994 and have well trained researchers in organising FFS. The Ministry of Agriculture of the Sennar state has realised the unique approach in the FFSs organised for small scale vegetable farmers between 1994-96 period and allocated additional funds for new positions and transport for its Department of Extension.

The FFS activities includes weekly meetings in the field throughout the whole growing season with a group of 15-20 farmers (the group often increases late in the season to 25-35

farmers). On-farm research is integrated with extension; farmers are trained in IPM during the sessions and are involved in validating technical options for pest control at farm level. The trainer meets with the farmers under a tree or "rakuba" shade next to the IPM demonstration field to discuss training subject for that week. They go to the field to observe the crop, discuss cultural practices and collect samples of insect pests, "Farmer's Friends" - beneficial insects and infected plants by diseases. The group returns to the shade to discuss what they saw, learned and collected; the trainer summarises the topic and discusses a subject for next week meeting with farmers.

Each FFS organiser (extensionist or plant protectionist) has an IPM FFSs guide for carrying out his activities as well as other reference materials provided during various workshops and training courses which would have equipped him with basic knowledge and skills to apply participatory approach and run the school successfully.

Key principles of the IPM FFS in the Sudan are based on the previous experience of the FAO IPM projects in south-eastern Asia and has included following activities:

- Training which covers the duration of the growing season;
- Proper cultural practices to growing a "healthy" crop, tolerant/resistant to local diseases and able to compensate for pest damage are implemented;
- A good knowledge of pests and their natural enemies, not in terms of their Latin names, but in terms of function, what they do to plants and to each other at what stage of the crop. Such knowledge also includes the development stages of a pest and their recognition. This knowledge is expected to be updated and improved by farmers, own observations and experimentation, and by farmer-to-farmer exchange of experience;
- Regular and systematic observation in the field, using systematic procedures (random selection of sampling) to asses the occurrence of pests and natural enemies in relation to the crop's development stage;
- Sound decision making and discussion with other farmers about such decisions. The process of decision making is more important than the decision itself;
- Experimentation with planting times, varieties, soil cultivation practices, fertilisation, rotation and biological control for their effect on pest populations; and
- Use of relevant, science-based knowledge, such as cultivar tolerance and regenerative capacity after pest damage and crop resistance to various pests and diseases. Economic impact of introducing new pest resistant cultivars should be done under farmers' conditions.

Farmers in each FFS are divided into 4-6 sub-groups headed by a formal leader. One of the aim of the IPM FFS is to help farmers to become experts in their fields, therefore the farmers' training is directed to improve work efficiency, interactions in a group and with extensionists and special matter specialists. It is expected that FFS will assist their members to be able to depend more on themselves in facing their production problems and organising their efforts in improving their income.

The key factor in establishing and running successful FFSs was a competent and well trained school organiser supported by an agronomist or an IPM specialist during weekly training sessions and by regular visits of the IPM Technical Committee including researchers and senior extensionists. The FFS organiser should use participatory methods based on principles of learning theory. Training sessions are stressing dialogue and horizontal communication in problem posing and problem solving.

The acceptance of the FFS curriculum developed for central Sudan by participating farmers has been critically reviewed by an independent team from the Department of Agricultural Extension of the University of Gezira after two years. It was recommended that the programme of the FFSs instead of concentrating on one crop (e.g. tomato, onion or wheat production and protection) should base on farm system approach and include the whole production system prevailing in various regions (small scale farmers versus farmers of the large agricultural schemes).

The FFS network includes three level activities and co-ordination: FFS organisers, Area Co-ordination Committees and the National IPM Steering Committee. The FFS organisers report to the Area Co-ordination Committee (ACC) comprising representatives of the local state Ministry of Agriculture, extensionists, plant protectionists, Farmers' Union and researchers of nearby research stations. The ACC is responsible for facilitating the exchange of experience and opinions among members on curriculum and validation of IPM options by FFSs; makes available requirements such as fuel, inputs, incentives and transportation; participate in field visits to evaluate the FFS curriculum and IPM demonstration fields; prepares annual plans and reports.

The National IPM Steering Committee is responsible for the implementation of IPM at the national level and is chaired by the Under-secretary of the Federal Ministry of Agriculture.

Evaluation of the farmers' field schools

Pre-training and post-training evaluation of knowledge, attitude and incorporation of IPM options by the participants of the FFSs established in central Sudan was based on a questionnaire addressing two types of information: independent variables (i.e., socio-economic characteristics and participation in the FFS sessions) and adoption of the IPM options presented in the FFSs. A stratified random sample technique was used to select a representative sample (8).

After 6-7 month of training there were noticed positive changes related to the implementation of IPM principles by participants of FFS. The percentage of farmers who could identify vegetable pests and beneficial insects has risen from 53% in Gezira state FFSs and 40% in Gezira scheme to 74% and 75% after training, respectively. More pesticides was always used on tomato compared to onion in all FFSs in pre-traning and post-training stages. However, the FFS farmers succeeded in reducing pesticide applications in these two crops. The average number of sprayings on tomato in Gezira state was reduced from 11.1 to 9.3 sprays (reduced by 1.8 spray) and from 3.7 to 2.4 sprays (reduced by 1.3 spray) on onion. In Gezira scheme, spraying on tomato was reduced from 9.8 to 8.4 sprays (reduced by 1.4) and on onion from 2.7 to 1.9 (reduced by 0.8 spray) in the 1994/95 season. The pesticides were used only by the FFS participants as

curative sprayings and were selected according to the occurrence of pests and their toxicity to human. In general, farmers' attitudes after their participation in the FFS became more positive towards reduction of preventive pesticide applications; daily crop follow-up; recognition of insects; discontinuing spraying of tomato at fruit setting stage; using proper cultural practices.The questionnaire used for the FFS evaluation can be found in Saadabi et al. (8) publication.

Partial budget analysis was used to examine the profitability of the IPM options adopted by the FFS participants and compared with traditional practices used by non-participants of the vegetable IPM FFSs in central Sudan. School farmers incurred a 5% higher cost than their neighbouring farmers due to the use of more costly seeds and more hand weeding. However, they spent 25% less on chemical pest control. Their average yield was 29% higher than that of the neighbouring farmers growing onion. The average yield of tomato was 151% higher for FFS participants than for non-participants (1). High values of calculated marginal rate of return for onion and tomato IPM options validated by FFS participants has reflected the high profitability of the packages.

Similar 30% yield increase was observed for cotton and wheat in fields managed by FFS participants in comparison to the non-participants having their fields under the same field conditions. The farmers implementing wheat IPM were shown how predators eliminated whole aphid colonies on leaves. When aphid population reached 35% infestation of tillers (recommended economic threshold level for spraying by the large schemes), farmers counted natural enemies and they have decided not to spray until the next weekly field practices and repeated counting of aphids and their natural enemies. The participants of the Wheat IPM FFS decided not to spray their fields in the 1995/96 season.

Average yield obtained in the Wheat FFS was 1.078 ton/feddan (2.56 t/ha), while other farmers collected an average of 0.8 t/feddan (1.9t/ha). The control treatments, i.e., the one collected by non-participants of FFS on fields under poor management gave only 0.642 tons/feddan (1.53t/ha). In addition to the significant yield increase by the FFS participating farmers in the 1995/96 season in comparison to their fields in previous season, the interfield variation expressed by a coefficient of variation was reduced from 27.9% to 17.1% in the last season, indicating increased quality of management by a larger group of farmers. In general, the participants of the wheat FFS were more informed than other farmers on the effect of various practices (land levelling, proper sowing rate, irrigation quality and quantity; fertilisation rate, negative effect of late harvest etc.) on wheat yield. They were very kind to apply most improved cultural practices in their IPM wheat crop in the future; 50% of FFS participants confirmed that they were willing to transfer their newly gained knowledge to other farmers.

Lesson to be learned

The FAO/ARC IPM project in the Sudan has demonstrated that the model developed by the FAO Inter-Country Rice Integrated Pest Control Programme in south and south-east Asia based on participatory approach in their IPM Farmers' Field Schools could be implemented also in other regions. The prime emphasis was on implementation of existing knowledge through training, rather than on new research. The extension activities did not focus on transferring specific technologies or bits of information in the FFSs. They rather sought to encourage farmers to take sound decisions by providing some basic principles.

The following experience and achievements of the IPM project GCP/SUD/025/NET in the Sudan should serve as the model for other countries in the region:

Critical importance to identify "real" farmer problems by collecting baseline information on the ecology of pests and their natural enemies, the relation between pest occurrence and yield losses; and the effect of cultural practices on pest and natural enemies in designing IPM strategies.

The farmer is the key person in IPM implementation through Farmer Field Schools. Top-down system concentrating on delivering inputs like resistant varieties and new pesticides, or simple messages like uni-dimensional thresholds fail to help farmers in understanding the concepts and field indicators of biological control. Unless farmers understand biological control, they cannot derive maximum benefit from other inputs.

Demonstration of the economic impact of the wide implementation of IPM options by vegetable, wheat and cotton growing farmers.

Synergistic effect on the government of the Sudan through involvement of policy makers in the IPM National Steering Committee, creating environmentally friendly policies related to plant protection decisions and increasing their support for a more sustainable agriculture in the Sudan.

Strengthening inter-disciplinary collaboration between agriculture research, extension, agriculture production schemes, universities and farmers' unions in developing and implementing IPM on cotton, wheat and vegetables.

Strengthening human capacity of trainers and researchers throughout study tours, individual advance training in selected IPM areas, group training courses and by involving more than 60 field staff in participatory research and training of farmers.

Winning the recognition of the FFS participants for the innovative and effective implementation of IPM Farmers' Field Schools which have addressed pressing production problems in the four regions in central Sudan.

Synergistic effect on other national and international agricultural projects in the Sudan. UNDP, IFAD and NGO sponsored projects has contacted the FAO/ARC IPM project for assistance in sharing the experience, trainers and training materials in establishing additional FFS/RWS in other regions.

الملخص

دابروسكي، ز. أ.أ. الصفار، أ.أ. عبدالرحمن. 1998. دور المدارس الحقلية للمزارع في تطبيق المكافحة المتكاملة للآفات. مجلة وقاية النبات العربية. 16(1): 27-31.

بات ادخال المدارس الحقلية للمزارع (FES) عام 1993 والمدارس الريفية للنساء (RWS) عام 1995 كنظام إرشادي جديد، مقبولا لصانعي القرار، وللوزارات الزراعية المحلية، ولمسؤولي المشاريع، والباحثين والزراع. ويستخدم اتجاه FES/RWS كطريقة ارشادية قياسية في مشروعي الجزيرة ورهد. وكان قد تم انشاء المدارس الحقلية للزراع والمدارس الريفية للنساء بداية في منطقة العبيد للزراعات البعلية. وتتضمن انشطة هذه المدارس اقامة لقاءات أسبوعية في الحقل خلال كامل فصل النمو تشترك فيها مجموعة من الزراع بحدود 25-30 مزارعا للمجموعة، وبذلك تتم مكاملة البحوث على مستوى المزرعة مع الارشاد، كما يتم تدريب الزراع في جلسات التدريب الأسبوعية، ومناقشة الخيارات الفنية لمكافحة الآفة والممارسات الزراعية المحسنة على مستوى المزرعة. ويتضمن الاتجاه الحديث لهذه المدارس التأثرات التالية ما بين المزارعين، متخصصي الارشاد، الباحثين، خبراء، وصانعي القرار: 1) تدريب الزراع وتهيئة المرشدين المحليين بطريقة المشاركة. 2) تعريض العلماء لمشكلات الزراع، واحتياجات ومصروفات الانتاج. 3) تدريب المرشدين وزيادة تفاعلهم مع الزراع. 4) التصرف كنقط اساسية حيث يلتقي الزراع مع الباحثين والمرشدين. 5) رفع اهتمام الزراع بامور سلامة البيئة والغذاء. 6) تحسين اتصال الزراع بمراكز البحوث الزراعية وجهاز الارشاد الحكومي. 7) ايجاد نظام بحثي ارشادي مستديم خاص بالمدارس الحقلية للزراع نظرا لإمكانية العدد الكبير من الزراع الذين يتخرجون من هذه المدارس الاسهام بدور المرشدين المحليين.

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