Facilitating Sustainable Agriculture: The Case of IPM in Cotton in Sindh Province of Pakistan

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ABSTRACT

From the commencement of the World Trade Organization (WTO), the Government of Pakistan (GoP) has implemented the Balancing, Modernizing Restructuring (BMR) plan to ensure it would take the chance to gain advantage from more liberalized trading environment. Aiming to equip the farmer’s community to take judicious decisions, new training approach called Farmer Field School (FFS) was introduced and the National Integrated Pest Management Programme (Nat-IPM) for cotton was launched in all provinces of Pakistan during 2001 to 2004. The fundamental theory behind this new training method was to enable farmers to be self sufficient in connection to agro-ecological sound IPM practices with special reference to cotton and create proximity between Extension field workers (facilitators) of agriculture department and farmers community. However assessment with regard to performance performed by facilitators was needed. Findings of the study revealed that FFS training had the potential to empower farmers in connection to agro-ecological sound IPM practices. The IPM-FFS approach was a favorable process for learning and field experiment. Facilitators performed positively and effectively in activities during Integrated Pest Management Farmer Field School (IPM-FFS) training programme in Sindh province as farmers showed positive attitude in relation to overall performance performed by facilitators.

Keywords: Farmer Field School, Integrated Pest Management, Facilitator, Agro-Ecological.

1. INTRODUCTION:

Cotton (*Gossypium hirsutum* L.) is a significant cash crop for Pakistan known as “white gold”. Pakistan is the world’s 4th biggest cotton producing country after China, India, and USA. It is a major source of export capital, accounting for 7.1 percent of value added in agriculture and 1.5 percent of the GDP. Pakistan’s cotton production increased 13.983 million bales, during 2014-15 as against 12.769 million bales in 2013-14, estimating an increase of 9.5 percent. Despite being one of the largest cotton growing countries, per acre cotton yield remains low as compared to other countries (GoP, 2015). The low yields result from unfavorable weather, pests attack and limited awareness of the pesticides and pest management options for improved cropping. Farmers use a variety of pesticides on cotton crop to eliminate insects and weeds from their fields, these pesticides can have the potential to harm human and the environment. The excessive or mistimed use of the pesticides can disrupt the growth of cotton beneficial insects and provide an opportunity for harmful pests to attack. Also the pesticides use increases production costs to growers (GoS, 2013).

To address these challenges, efforts have been taken to minimize dependence on the pesticides through the implementation of Integrated Pest Management (IPM) Farmer Field Schools (FFSs) (Page & Ritchie, 2009). Unfortunately, in most cases the IPM-FFSs have had achieved limited success in reducing the use of pesticides (Fitt *et al.*, 2004). To a certain extent, reasons are environmental uncertainty, poor knowledge of farmers and untrained IPM experts.

The IPM research has a long history in Pakistan. This was established in, as early as 1971 at the Pakistan Agriculture Research Council (PARC) station Rawalpindi. Its initial task was funded by the Asian Development Bank. It had the seven-year projects that included PL-480 project on bollworms, three year PL-480 project on the whitefly and a project on the IPM, as well. These projects had no beneficial effects on the production level. That was so because these projects were devoid of the required facilities and the opportunities to work with the organizations and the staff was unskilled as well. Moreover, the agriculture universities also do not produce IPM experts for staffing research, education and extension organization (GoS, 2012). The situation described above may represent more
than just a technological failure. No access to extension services and the farmers’ lack of adequate alternatives also account for these outcomes.

In connection to agro-ecological sound farming, in the strategy and policy for agricultural development by government of Pakistan, extension field workers were trained to empower the farmers in growing healthy cotton crop by understanding agro-ecosystem and conserving bio-diversity with Good Agricultural Practices (GAP) to increase profit margin of farmers. Potential stakeholders took efforts and launched FAO-EU funded National Integrated Pest Management Programme (Nat-IPM) for Cotton in Pakistan from 2001-2004 and introduced new extension training methodology called Farmer Field School (FFS). FFS training emphasized that the crops should be healthier with minimum and rational use of pesticides in order to avoid the adverse impact on the nature and encouraged to stick with the natural pest mechanism through IPM practices.

2. LITERATURE REVIEW

A literature review is a text of a scholarly paper, which includes the current knowledge including substantive findings, as well as theoretical and methodological contributions to a particular topic.

2.1 Concepts of Farmer Field School

The Farmer Field School (FFS) concept originated in 1989, when the FAO inter-country IPM programme developed this new model for farmers training on Integrated Pest Management based on cropping systems in Indonesia (Kenmore, 1991). Following are basic concepts of the FFS.

2.1.1 Adult non-formal education:

It can be defined as the developing of quality of life, enhancing learning outside the system of formal school. This apparently accepts human values as a pre-condition for learning. The FFS has been developed from the idea that the farmers should be trained correctly and mainly from the field observations and experimentations. The FFS is a kind of adult education, and it has been created to assist farmers to equip themselves with IPM practices to various harsh agro-ecological conditions (Berg, 2004). The FFS is an informal training programme for selected farmers within an area, especially a village. It has a social purpose of the promotion and empowerment of the farmers by developing them socially and economically (Pakistan Environmental Watch, 2012).

2.1.2 Participatory approach based experiential learning:

The FFS is participatory approach, based on the experimental learning. It facilitates mutual discussion over crops among the farmers from planting to harvest, sharing of information about the crops, pests, and the conditions of a particular area with the farmers (Miagostovich et al., 1999). Participatory approaches have been broadly embraced within the development sector. These approaches were projected “to enable those individuals and groups who were previously excluded by more top-down planning processes and they were often marginalized by their separation and isolation from the production of knowledge and the formulation of policies and practices, to be included in decisions that affected their lives” (Kothari, 2001).

Berg et al. (2004) defined that experiential education and assistance are required to bring the farmers within the ambit of learning, making them to realize that the field research is an organ of farming system. FFS provides an opportunity to the people to involve actively. The participants have time to propose clear solutions of problems that are otherwise difficult. Their collective efforts will bring innovative methods for solution.

Nederlof and Oknodor (2007) felt that scientist needed to establish more cooperation based on mutual respect among scientists, facilitators and farmers. They felt that the experiential learning element still focused on researchers’ objectives rather than what was appropriate for the farmers. Whether the FFS is seen as a method of technology transfer or an experiential learning technique based on adult education principles. It would have depended on the aims that observer ascribes to the FFS. The FFS goals can be farmer empowerment, their ability to experiment or ability to make effective decisions.
2.1.3 Cotton eco-system analysis:

The Cotton Eco-System Analysis (CESA) is the most important practice of the FFS. This is based on the observation of interaction of crop and aims at carrying on regular field visits and solving problems. The CESA enables the farmers for making appropriate decisions and executing them. This process monitors the results of the implemented decisions and its impacts (Gallagher, 2003).

CESA is a core farmer field school activity. In CESA, farmers are required to record the crop growth stages, the presence of harmful and beneficial insects, weather soil and all over crop conditions on a large paper poster. The recording on the posters is meant to observe the ecological and climatic conditions which affect the crops. The recording of observations is kept for conclusions and implementations. The farmers’ groups discuss the findings each week and suggest proper actions. For better understanding, insect zoo be formed in through which the farmers can closely observe the lifecycle of the insects from larva to an adult to observe that how predatory insects and spider attack on many kinds of insects. Every group of farmers selects a representative who presents the observations in front of the other farmers for discussions (Ooi et al., 2004).

2.2 Elements of Farmer Field School

The main elements of each FFS session are:

2.2.1 Participant group: This comprises of 20 to 25 participants (Braun, Thiele & Fernandez, 2000). The group has multi-genders depending on the cultural norms. The FFS groups comprise of social or community groups.

2.2.2 Field location: One of the main features of the FFS is to deal with the field treating it as its soul (Gallagher, 2003). In the field work, the farmers learn through practice. Solving problems in the field is easier than in a class room.

2.2.3 Facilitator: An assistant can be an extension agent or a senior of the same FFS. The assistants provide just learning and discussion environment.

2.2.4 Curriculum: This must be pertinent to the subject. If the subject is about crops, it covers it from sowing to harvest. This permits application of knowledge and learning directly.

2.2.5 Financing: The FFS funding can be obtained from multi-organizations or the World Bank projects. The cost is not the same because of changed location, conveyance and equipment requirements. The cost is high at the start of the project (Gallagher, 2003).

2.3 Conventional Extension Methods Verses FFS training

In FFS training, the extensionists’ role shifts from “teachers to facilitators” (Hannover & Wafa, 2003). Further, Hofisi (2001) conducted a study to compare conventional extension with FFSs. Through ranking exercises, the following points came out, which show the difference in attributes.

2.3.1 Information flow:

Conventional extension: The knowledge transfers from the facilitator to the unaware farmers.

Farmer field schools: The farmers were provided the opportunities to share their ideas as well.

2.3.2 Follow ups:

Conventional extension: Almost no follow up. When a problem emerges the farmers do not visit the extensions fearing that they will not respond them as they are government employees.

Farmer field schools: The farmers meet their Farmer Field workers weekly. They also keep on follow up. In the FFS, they obtain information from the farmers’ group.

2.3.3 Farmers’ innovation and intercropping:

Conventional extension: New methods used by farmers are not considered which have led towards the extinction of the crops and domestic varieties.

Farmer field schools: The farmers’ new ideas are given weightage. The farmers provide and develop cultivation techniques themselves. This has encouraged the recovery of the local crop varieties.

2.3.4 Dissemination of farmers’ ideas:

Conventional extension: The ideas of the farmers do not move swiftly to other areas because of lack of opportunity. The farmers get only a single day, which is the field day, in the whole year to express their ideas.
Farmer field schools: The farmers’ ideas reach other areas swiftly because of provision of opportunities.

2.3.5 Use of available resources:
Conventional extension: The extensionists are willing to work only with those farmers who buy the fertilizers and pesticides from them, while they pay no heed to the problems of the resource-scarce farmers.
Farmer field schools: This provides opportunity to all farmers and pays attention to them equally.

2.3.6 Experimentation and solutions:
Conventional extension: The suggestions based on proven scientific technologies by the farmers include costly fertilizers and pesticides that are unaffordable to the resource-scarce farmers.
Farmer field schools: They help farmers to find out solutions of their agricultural problems with the help of available resources to them.

2.3.7 Learning duration:
Conventional extension: Learning is continuous only in the presence of the extensionists and there is no farmer to farmer contact.
Farmer field schools: Their learning goes on whole year. They share information with one another.

2.3.8 Field support:
Conventional extension: Lack of field support. The extensionists' have no enough financing, despite that they are sent for covering large areas. This results that the extensionists’ visit only a handful farmers of a particular area, while they are unable to reach the bulk of the farmers of the same area, giving birth to complaints from those farmers they never visited.
Farmer field schools: Each extensionists’ visits FFS regularly. This pertinent approach creates an opportunity for both facilitator and farmer to build relationship frequently and frankly and discuss various issues regarding their crops.

3. MATERIAL AND METHODOLOGY
Integrated Pest Management Farmer Field Schools were established during 2001 to 2004 under National Cotton IPM Programme in Sindh Province of Pakistan. A descriptive research study was carried out. In descriptive survey research, the researcher selects a group of respondents, collects information and then analyzes the information to answer the research questions (McMillan, 2008). The target populations of this study was categorized in three groups; i.e. trained group (IPM-FFS participants), exposed group (non-IPM-FFS participants but from villages exposed to IPM-FFS training), and control group (farmers who were neither involved in IPM-FFS nor living in IPM-FFS village) - figure 1. A list of the original IPM-FFS trained farmers (trained group) were obtained from National IPM-FFS programme coordinator, Director General, Agricultural Extension Wing, Hyderabad, Sindh. The sample was determined using “Table for determining random sample size from a given population” at 95% confidence level and 5% (+ or -) margin of sampling error rate (Fitz-Gibbon & Morris, 1987). Four districts of Sindh Province were selected for the study Area viz., Hyderabad, Tando Allahyar, Matiari and Mirpurkhas.

The total 144 sample size of farmers (trained group) included in the research study were evenly distributed by district (36 from each district). Furthermore, the list of cotton farmers who did not participate in IPM-FFS training programme (Exposed and Control), using non-probability technique of quota sampling, the second category of exposed, 144 farmers were taken from villages where IPM-FFS training had occurred and from the third category of control, 144 farmers were taken from the villages situated at least 15 kilometers of distant from IPM-FFS villages and with the radius of about 20 kilometers (figure 2). Assumed enough distance to possible dissemination of IPM knowledge; where sufficient cotton growing farmers were available to obtain cross-sectional data. Hence, total 432 farmers were included in the research study. Within each of the farmer categories, live in FFS and Non-FFS villages considering the matching characteristics such as age, education and landholding were established. The questionnaire was developed in consultation with the IPM-FFS experts and following review of available literature. The concepts or ideas were predominantly measured through different statements on a continuum ranging from negative to positive. Despite several efforts, a total
response rate of 93.75% was obtained, with more than 60% response rate considered sufficient for comparison between two or more groups and for validation of the research results (Wunsch, 1986). A data coding sheet was developed and all data were analyzed using appropriate statistical analysis techniques, with IBM-SPSS. Frequency, percentage, mean and standard deviation were calculated.

**Figure 1:** Determination of Sample of Farmers

**Figure 2:** FFS and Non-FFS Villages

4. **RESULTS AND DISCUSSION**
   This part contains the results on aspects covered in this study along with logical interpretation under respective sub-headings.

4.1 **Demographic Information of Farmers**

   Figures 3 shows that most of the trained farmers were falling in the age group of 21-30 years, exposed farmers were in the age group of less than 20 years and control farmers were in the age up to 30 years. Majority of trained farmers (27.4%) were educated up to primary level; exposed (24.4%) and control (25.9%) farmers were illiterate with slight difference. While 11.1%, 8.9%, and 10.4% of the trained, exposed and control farmers were found graduate respectively (fig-4). Majority of trained, exposed and control farmers were tenants (fig-5). Large number of all categories of farmers had farming experience in the range of 11 to 20 years followed by the farmers had less than 10 years of experience (fig-6) and most of them were involved in IPM-FFS training programme in the interest of their self development (fig-7).

**Figure 3:** Age Profile

**Figure 4:** Educational Level
4.2 Farmers’ Perception of Facilitators Performance Performed in IPM-FFS Training

The twenty three (23) different statements were developed statements related to IPM-FFS training programme through a five-point Likert scale (e.g. 1=Strongly disagree, 2=Disagree, 3=Undecided, 4=Agree, 5=Strongly agree) for measuring the farmers’ perception of overall performance performed by facilitators during IPM-FFS training programme and it was found that on the most of statements farmers’ perceived ‘Somewhat favourable’ and ‘Strongly favourable’, showing highly positive attitude in relation to performance performed by facilitators during IPM-FFS training programme. The data gathered to this regard (table 1) indicate that Majority of the farmers were ‘strongly agreed’ that facilitator’s attitude was neutral and natural with all FFS participants which was highest average statement (4.24) recorded with the standard deviation 0.88. Besides, the table shows that farmers were with the statement that facilitators monitored and evaluated the IPM-FFS training to achieve the objectives 3.67 (lowest average) with the standard deviation 1.12. The same results were reported by Kenmore (2002) who stated that IPM-FFS is a training approach that trains farmers to compare new techniques in systematic field assessment and it prepares extension agents for their new roles as facilitator and representatives of public problems and difficulties such as environmental conservation, health, social involvement and organization. In another report Bartlett (2005) stated that the FFS training model for extension in Asia have involved over two million farmers in more than a dozen countries, supported by agriculture extension and international agencies. Across Asia, FFS helped hundreds of thousands farmers to learn IPM practices, about agro-ecological concepts, indiscriminate use of pesticides and increase crop yields.
Table 1: Farmers’ perception of performance performed by facilitators

<table>
<thead>
<tr>
<th>Statements About Facilitators’ Performance</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Facilitator attitude was neutral and natural with all FFS participants.</td>
<td>4.24</td>
<td>0.88</td>
</tr>
<tr>
<td>2. Facilitator communicated with the participants in a local language.</td>
<td>4.19</td>
<td>0.82</td>
</tr>
<tr>
<td>3. Facilitator involved himself and was flexible in participation in all IPM-FFS activities.</td>
<td>4.14</td>
<td>0.72</td>
</tr>
<tr>
<td>4. Facilitator listened to questions completely and carefully before replying to participant.</td>
<td>4.12</td>
<td>0.76</td>
</tr>
<tr>
<td>5. Facilitator showed his full cooperation with the participants during the FFS training.</td>
<td>4.10</td>
<td>0.87</td>
</tr>
<tr>
<td>6. Facilitator seemed active and energetic during IPM-FFS training.</td>
<td>4.09</td>
<td>0.62</td>
</tr>
<tr>
<td>7. Facilitator dealt softly and politely with participants.</td>
<td>4.07</td>
<td>0.60</td>
</tr>
<tr>
<td>8. Facilitator believed in two ways communication process.</td>
<td>4.07</td>
<td>0.72</td>
</tr>
<tr>
<td>9. Facilitator was a well trained and technically sound extension field worker.</td>
<td>4.02</td>
<td>0.79</td>
</tr>
<tr>
<td>10. Facilitator accepted criticism for self appraisal and tried to improve his skills.</td>
<td>4.00</td>
<td>0.86</td>
</tr>
<tr>
<td>11. Facilitator conducted IPM-FFS activities step by step and an organized manner.</td>
<td>3.97</td>
<td>0.76</td>
</tr>
<tr>
<td>12. Facilitator had an ability to interact with all participants and kept them active.</td>
<td>3.95</td>
<td>0.97</td>
</tr>
<tr>
<td>13. Facilitator used appropriate methods and kept focus on the IPM-FFS activities.</td>
<td>3.93</td>
<td>0.73</td>
</tr>
<tr>
<td>14. Facilitator used group dynamics exercises and ice breakers in an appropriate time.</td>
<td>3.92</td>
<td>0.97</td>
</tr>
<tr>
<td>15. Facilitator identified and resolved the issues of participant related with the IPM-FFS.</td>
<td>3.91</td>
<td>0.91</td>
</tr>
<tr>
<td>16. Facilitator appreciated and encouraged the participants to build up their confidence.</td>
<td>3.90</td>
<td>0.86</td>
</tr>
<tr>
<td>17. Facilitator involved participants in decision making through participatory approach.</td>
<td>3.87</td>
<td>0.95</td>
</tr>
<tr>
<td>18. Facilitator created space for every participant to involve them in discussions.</td>
<td>3.87</td>
<td>0.93</td>
</tr>
<tr>
<td>19. Facilitator tried to manage time properly to complete IPM-FFS activities in set schedule.</td>
<td>3.87</td>
<td>0.86</td>
</tr>
<tr>
<td>20. Facilitator really handled and resolved the conflicts among participants, professionally.</td>
<td>3.87</td>
<td>0.84</td>
</tr>
<tr>
<td>21. Facilitator always responded to participants’ question timely and in a consistent manner.</td>
<td>3.80</td>
<td>1.03</td>
</tr>
<tr>
<td>22. Facilitator used practical examples to stimulate discussions among participants.</td>
<td>3.76</td>
<td>1.01</td>
</tr>
<tr>
<td>23. Facilitator also monitored and evaluated the IPM-FFS training to achieve the objectives.</td>
<td>3.67</td>
<td>1.12</td>
</tr>
</tbody>
</table>

Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, 5 = Strongly Agree
M = Mean, SD = Standard Deviation

4.3 Farmers Perceptions of Sustainability of IPM Training Programme

The perceptions of farmers about sustainability of IPM-FFS training programme were recorded by enquiring about various statements. Mean and standard deviation on a five-point Likert scale (e.g. 1=Strongly disagree, 2=Disagree, 3=Undecided, 4=Agree, 5=Strongly agree) are presented in table 3. It was found that majority of the farmers showed reservations in connection to ‘No refresher training course was arranged for cotton farmers since the IPM programme ended’, (4.18±0.79) and it was highest average statement. It was also observed that on the statement ‘Concept was not clear so farmers avoided to adopt the agro-ecological sound IPM practices (2.45±1.02) was lowest average statement, as perceived by FFS graduate farmers. Mallah and Korejo (2007) found that IPM-FFS programme ensures the sustainability of agricultural growth, because these programmes have a positive impact on farmers’ knowledge regarding crop protection and production practices.
Table 2: Farmers perception of IPM-FFS training programme

<table>
<thead>
<tr>
<th>Statements About Sustainability</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. No refresher training course was arranged for cotton farmers since the IPM programme ended.</td>
<td>4.18</td>
<td>0.79</td>
</tr>
<tr>
<td>2. Agriculture extension provided very weak support after the phase out of IPM programme.</td>
<td>3.62</td>
<td>1.12</td>
</tr>
<tr>
<td>3. Pesticide dealers discouraged farmers to follow agro-ecological sound IPM practices.</td>
<td>3.29</td>
<td>1.13</td>
</tr>
<tr>
<td>4. Main reason of not adopting IPM technology was lack of participatory approach among farmers.</td>
<td>3.28</td>
<td>1.04</td>
</tr>
<tr>
<td>5. There was no extra benefit of adopting IPM technology and growing healthy cotton crop.</td>
<td>3.13</td>
<td>1.26</td>
</tr>
<tr>
<td>6. Practicing IPM-FFS activities were difficult and time consuming where pesticides easy to apply.</td>
<td>2.79</td>
<td>1.20</td>
</tr>
<tr>
<td>7. There was a lack of confidence among farmers to adopt the IPM technology.</td>
<td>2.74</td>
<td>1.11</td>
</tr>
<tr>
<td>8. Use of pesticides became a reliable method so farmers felt that it's useless to go for IPM-FFS activities.</td>
<td>2.64</td>
<td>1.00</td>
</tr>
<tr>
<td>9. Unavailability of required tools/material was one of reason for not continuing IPM-FFS activities.</td>
<td>2.60</td>
<td>1.18</td>
</tr>
<tr>
<td>10. Concept was not clear so farmers avoided to adopt the agro-ecological sound IPM practices.</td>
<td>2.45</td>
<td>1.02</td>
</tr>
</tbody>
</table>

Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, 5 = Strongly Agree
M = Mean, SD = Standard Deviation

4.4 Ranking of Barriers Faced by Farmer during IPM-FFS Training

The barriers/constraints faced by the farmers during IPM-FFS activities were ranked and according to the farmers’ perception (table 3) IPM-FFS activities were time consuming, lack of incentives, lack of mutual understanding among farmers, strict and hectic schedule, sometimes facilitator behavior and discouraging attitude of the pesticide/fertilizer dealers were main barriers/constraints. Despite the facing problems during IPM-FFS, farmers’ interest in training shows realization about the indiscriminate use of pesticides as well as benefits of environmentally sound IPM practices. Somewhat similar findings were found by Mancini et al. (2005) who described that major constraints that affect technology transfer process are extension system lapses, lack of cooperation by farmers, uncertainties experienced in agriculture, and conflicts among farmers.
Table 3: Rank wise barriers/constraints faced by farmers in IPM-FFSs

<table>
<thead>
<tr>
<th>Barriers/Constraints</th>
<th>Rank Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPM-FFS activities were difficult and time consuming.</td>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
</tr>
<tr>
<td>There was no extra benefit of adopting agro-ecological sound IPM practices.</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
</tr>
<tr>
<td>There was lack of participatory approach among farmers during IPM-FFS training.</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt;</td>
</tr>
<tr>
<td>Participants lost interest in IPM-FFS training due to strict and hectic schedule.</td>
<td>4&lt;sup&gt;th&lt;/sup&gt;</td>
</tr>
<tr>
<td>Facilitator usually not replied the questions so it was embracing for participants.</td>
<td>5&lt;sup&gt;th&lt;/sup&gt;</td>
</tr>
<tr>
<td>Influence of pesticide dealers discouraged participants to follow IPM practices.</td>
<td>6&lt;sup&gt;th&lt;/sup&gt;</td>
</tr>
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</table>

5. CONCLUSIONS AND RECOMMENDATIONS

IPM-FFS have been deployed around the Sindh Province of Pakistan. However assessment with regard to performance performed by facilitators was needed. Findings of the study revealed that FFS training had the potential to empower farmers in connection to agro-ecological sound IPM practices. The IPM-FFS approach was a favorable process for learning and field experiment. Facilitators performed positively and effectively in activities during Integrated Pest Management Farmer Field School (IPM-FFS) training programme in Sindh province as farmers showed positive attitude in relation to overall performance performed by facilitators. Majority of participants indicated that they had engaged in programme activities on their self interest for improving their agro-ecological sound farming skills with special reference to cotton, which shows facilitators created inter-personal trust among FFS participants on IPM-FFS training programme that is essential for working mutually and evolving innovations. It was suggested that the farmers can be good source for transferring the obtained knowledge of agro-ecological sound IPM practices to their community. Regarding this, agriculture department needs to play an important role to support and persuade farmers who were participated and trained in IPM-FFS series of trainings during the years 2001 to 2004.

REFERENCES


