ANALYSIS OF THE EFFECTIVENESS OF FARMER FIELD SCHOOLS IN COMMUNICATING NEW SKILLS AND KNOWLEDGE TO FARMERS IN KHYBER PAKHTUNKHWA, PAKISTAN

AMIR KHATAM¹, SHER MUHAMMAD², KHALID MEHMOOD CHAUDHRY², ASHFAQ AHMAD MANN³ and MUHAMMAD IDREES⁴

¹ Agriculture Department (Extension), Khyber Pakhtunkhwa – Pakistan.
² Institute of Agricultural Extension and Rural Development, University of Agriculture, Faisalabad – Pakistan.
³ Department of Rural Sociology, University of Agriculture, Faisalabad – Pakistan.
⁴ Department of Agricultural Extension Education & Communication, The University of Agriculture, Peshawar – Pakistan

ABSTRACT

The paper focuses on the study conducted in 2010 to analyze effectiveness of Farmers Field Schools (FFS) in communicating new skills and knowledge to farmers in Khyber Pakhtunkhwa, Pakistan. For this purpose, seven districts from Khyber Pakhtunkhwa Province of Pakistan including Peshawar, Charsadda, Nowshera, Mardan, Swabi, Kohat and Hangu were selected. Data regarding effectiveness of FFS were obtained from 280 randomly selected farmers through “survey” method and were analyzed using descriptive statistics i.e. means and standard deviations. However, researchers also applied a paired t-test to determine the difference between the pre and post FFS scenarios in the study area. The results show that during the training in crop production technology, the timely and balanced use of fertilizers was ranked 1st with mean values 3.38 and 3.87 closely followed by High yielding varieties and Soil analysis which were ranked 2nd and 3rd by the farmer respondents with mean values of 3.36, 3.89 and 3.35 and 3.94 in the pre- and post-FFS scenarios, respectively. Similarly, during the training in crop protection technology, identification of pest and predator was ranked 1st with mean values of 3.34 and 3.94. Seed treatment with fungicides was ranked 2nd with mean values 3.33, 3.74 and Insect pests control by local recipes was ranked 3rd with mean values of 3.29 and 3.96 in pre- and post-FFS scenarios, respectively. Likewise, manual weed control was ranked 1st with mean values of 3.41 and 3.94 followed by chemical weed control and cultural weed control which were ranked 2nd and 3rd with mean values 3.33, 3.74 and 3.31 and 3.73 in the pre- and post-FFS scenarios, respectively. In the same way, furrow irrigation technique was ranked 1st with mean values of 3.44 and 3.88 followed by Boarder and cultural Drip irrigation techniques which were ranked 2nd and 3rd with mean values of 3.42, 3.89 and 3.39 and 3.86 in the pre- and post-FFS scenarios, respectively. This situation shows a highly significant difference between the pre and post FFS scenarios which mean that sufficient improvement was made in the skill and knowledge of farmers regarding various farming practices in the study area.

Key Words: Extension Approaches, Farmer Field School, Communicating New Skills.


INTRODUCTION

Despite agro-based economy, the smooth food supply to the growing population of Pakistan has always been a challenge for scientists working in agricultural sector of the country. This needs to plan effective program that goes beyond dissemination of technologies among farmers, to help small farmers organize themselves for sharing production and protection technologies, marketing and advocacy in such a way that empowers the farming community (David, 2007) in solving problems and developing their innovative skills. These objectives can be achieved through FFS approach which promotes group learning most favorably from field observation and experimentations based on the principles of adult education and training of farmers (van den Berg, 2007).

FFS is described as a platform and “school without walls” that improves decision making capacity of farming community and stimulate local innovation for sustainable agriculture. It is a group extension method, which teaches basic agro-ecology and management skills that make farmers experts at their farms. Throughout FFS session, farmers meet regularly to experiment as a group with new crop production technologies. Normally FFS groups have 25-30 farmers in the group. After the training period, farmers continue to meet and share information, with less dependence on extension workers.

FFS aims to augment the capacity of groups of farmers to test new technologies in their own fields, evaluate the results they obtained and test their relevance to their environments, and interact on a more demand
driven basis with the researchers and extension workers looking to them for help where they are not able to solve a specific problem themselves (Godrick Khisa, 2004). However, David, (2007) concluded some social benefits from FFS on the basis of farmers’ perception which were: ability to arrive at group consensus, making observations before making farm management decisions, ability to make confident public speech, better at working in a group, and making experiments more with cocoa and other crops as reported by farmer respondents. He added that FFS can be a starting point for bringing about change by improving farmers’ skill to make observations, gain new knowledge and apply it to solve their problems, communicate in a better way, have increased self confidence, and form group to support cocoa production activities as well as other livelihood initiatives.

Similarly, Simpson and Owens (2002) stated that FFS approach had a significant role in providing the opportunity for farmers to gain an understanding of important concepts and relationships. FFS graduates have proven to be more able to communicate new plant protection and production technologies to others in their immediate localities and beyond, and in some cases had made significant contributions to local agricultural developments. Similarly, Buyu et al. (2003) concluded that FFS facilitates understanding regarding local structures especially the social affiliations that act as a form of social capita. Participatory technology development activities rely on willingness of individuals to mobilize resources and communicate information. Such a collective effort would facilitate comparison of new and existing practices in the community.

Mutandwa and Mpangwa (2004) evaluated the impact of FFS on Integrated Pest Management (IPM) dissemination and its usefulness which showed that yield of crops, income of cotton and technical knowledge for FFS participants were greater than those who did not participate in FFS. Kwarteng et al. (2004) concluded that FFS approach had a significant impact on agricultural extension work by improving competencies of farmers and extension workers through activities in team building, technical trainings, trainings of Participatory Technology Development and Extension (PTD & E), laying out demonstration of plots, developing organizations, capacity building in dealing with financial matters, supervision by drawing and disbursing officers, participating at various levels of programming, comprehending various principles of IPM and application of IPM technological options.

On the contrary, Braun et al. (2005) found that information gained from FFS education is often not expected to diffuse but to generate social and economic multiplier effects that deliver positive public and private benefits. Preliminary data suggest that information, and simple practices that can be observed by non-participating farmers, do diffuse from FFS participants, to some extent, but not the self-confident knowledge and skills in problem-solving required for the kinds of purposes for which FFS seems best suited. However, empowerment outcomes reported from FFS include changes in perspectives with boosted self-confidence and pride, as well as social change and action being triggered following participation in FFS. Farmers have gained agency in terms of taking a greater control over their lives.

Duveskog and Friis-Hansen (2008) stated that in Mwingi district of Kenya a local stockist selling agro-inputs explained that non-farmers often blankly used to come and ask him to tell them which seed to buy without ever questioning experts’ advice. However FFS graduates often would confidently come and ask for a specific variety, and when the stockist enquired how the farmers were able to specify certain items, they referred this change to reflections upon actual field experience for why they demanded the particular item. This indicates an increase in the knowledge of the farmers who obtained the FFS training. Furthermore, they concluded that FFS play an important role in serving as a platform for human capacity building and empowerment, which in turn can ensure the success of services provided for the development of community.

Asiabaka et al. (2003) stated that in FFS farmers become researchers and test various technologies and make confident decisions about the best technology for specific environments. In the process of technology development, farmers occupy the central position and extension worker acts as a facilitator. FFS stress the need that training should be designed in such a way that conclusions can be easily drawn by the farmers. This process will ultimately empower them in improving the socio-economic environment.

FFS is a season-long, field oriented and discovery-based learning opportunity. It comprises a group of approximately 25 to 30 farmers. These farmers attend the field school weekly in vegetables and fortnightly in case of cereals and and orchards to learn through discoveries and simple experimentations. FFS creates conformity between conventional and scientific knowledge thus enabling farmers better decision makers in their respective agro-ecology. FFS develop as well as modify technologies that actually work and acceptable to farmers (Nederlof et al., 2004; Röling, 2002; Röling et al., 2004).

Equally important were the results of Khatam et al. (2010-а) who concluded from their studies that FFS approach improves knowledge of farmers, helps farmers in learning by doing, discourages the use of pesticides, promotes local plant protection recipes, provides systematic training and learning process, helps farmers in problems identification themselves, encourages balanced use of fertilizers, reduces cost of production, promotes community organization, introduces better leadership, inculcate communication and management skills, serves as a demand driven extension approach, improves linkages among research, extension and farming community, fills gaps in local
knowledge, assists farmers in implementing their decisions, provides systematic evaluation of different technologies, facilitates farmers in situation analysis, builds confidence in farming community, changes farmers’ attitude, improves the overall socio-economic conditions, and increases per capita income. Keeping the aforementioned importance of FFS approach in view the present study was designed with the following objectives (1) To analyze effectiveness of farmers’ field schools in communicating new skills and knowledge to farmers in Khyber Pakhtunkhwa, Pakistan and (2) To present recommendations for improvement FFS approach.

MATERIALS AND METHODS

The population for the study consisted of the farmers in the study area comprising 7 districts of Khyber Pakhtunkhwa, Pakistan i.e. Peshawar, Charsadda, Nowshera, Mardan, Swabi, Kohat and Hangu. Using the table for sample size (Fitzgibbon and Lynn, 1987) a random sample of 40 farmer respondents was selected from each district from the list of FFS farmers provided by Agriculture Department (Extension) thereby making a total of 280 farmer respondents. The data were collected by the researchers using “survey” method. An interview schedule was constructed. Validity of the questionnaire was checked by the experts of the Agriculture Department (Extension) and Agriculture University, Peshawar. The questionnaire was also pre-tested for its reliability. For this purpose five farmers from each of these districts were interviewed. The 35 farmers interviewed for pre-test were not included in the sample. The data were analyzed using computer software called Statistical Package for Social Sciences (SPSS). To analyze the data, descriptive methods of statistics were used. Means and standard deviation were computed for different variables. However, researchers also applied the paired t-test to determine the level of significance for the pre- and post-FFS scenarios.

RESULTS AND DISCUSSION

Data in Table 1 reveal a highly significant difference between the pre and post-FFS scenarios which mean that sufficient improvement was made in the skill and knowledge of farmers regarding crop production technologies in the study area. However, during FFS training in crop production technology, the timely and balanced use of fertilizers was ranked 1st with mean values of 3.38 and 3.87 closely followed by High yielding varieties and Soil analysis which were ranked 2nd and 3rd with mean values of 3.36, 3.89 and 3.35 and 3.94 in the pre- and post-FFS scenarios by the farmer respondents, respectively. The highest difference in the aspect of Soil analysis was due to the opportunity of learning by doing as well as collecting the soil sample themselves from the field under FFS in the project area.

The mean values indicate that perception of farmer respondents regarding all aspects in the pre-FFS conditions ranged from medium to high but tended towards medium and tended towards high in case of post-FFS scenario. The results of the present study are supported by those of van den Berg (2004) who stated that FFS approach promotes group learning optimally from field observation and experimentation based on principles of adult education and training of farmers is seen as the single approach of agricultural extension that can meet these goals, similarly, Pontius (2002) also concluded that FFS is a type of education that uses experience based learning methods to build up the expertise of farmers in various aspects of farming.

Table 1. Respondents reporting improvement in their skill and knowledge regarding Crop production technologies

<table>
<thead>
<tr>
<th>Crop Production Technologies</th>
<th>Pre Mean ± SD</th>
<th>Post Mean ± SD</th>
<th>t-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursery raising techniques</td>
<td>3.32 ± 0.55</td>
<td>3.84 ± 0.61</td>
<td>-9.43</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>High yielding varieties</td>
<td>3.36 ± 0.56</td>
<td>3.89 ± 0.56</td>
<td>-10.65</td>
<td>&lt;0.003**</td>
</tr>
<tr>
<td>Seed rate</td>
<td>3.33 ± 0.54</td>
<td>3.85 ± 0.57</td>
<td>-9.43</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>Seed bed preparation</td>
<td>3.39 ± 0.47</td>
<td>3.91 ± 0.58</td>
<td>-10.71</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>Sowing methods</td>
<td>3.30 ± 0.53</td>
<td>3.74 ± 0.63</td>
<td>-11.63</td>
<td>&lt;0.002**</td>
</tr>
<tr>
<td>FYM decomposition</td>
<td>3.34 ± 0.55</td>
<td>3.88 ± 0.62</td>
<td>-9.94</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>Timely and balanced use of fertilizers</td>
<td>3.38 ± 0.64</td>
<td>3.87 ± 0.65</td>
<td>-11.12</td>
<td>&lt;0.002**</td>
</tr>
<tr>
<td>Soil analysis</td>
<td>3.35 ± 0.63</td>
<td>3.94 ± 0.68</td>
<td>-9.18</td>
<td>&lt;0.001**</td>
</tr>
</tbody>
</table>

Source: Survey data; * = Significant (P<0.05); ** = Highly significant (P<0.01)

<table>
<thead>
<tr>
<th>Crop Protection Technologies</th>
<th>Pre Mean ± SD</th>
<th>Post Mean ± SD</th>
<th>t-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pest control through appropriate pesticides</td>
<td>3.22 ± 0.46</td>
<td>3.82 ± 0.56</td>
<td>-7.82</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>Insect pests control by local recipes</td>
<td>3.20 ± 0.50</td>
<td>3.70 ± 0.65</td>
<td>-5.98</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>Seed treatment with fungicides</td>
<td>3.33 ± 0.58</td>
<td>3.74 ± 0.63</td>
<td>-7.03</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>Insect pests management with bio-control</td>
<td>3.29 ± 0.53</td>
<td>3.96 ± 0.67</td>
<td>-6.67</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>Identification of pest and predator</td>
<td>3.34 ± 0.58</td>
<td>3.94 ± 0.65</td>
<td>-5.43</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>Mass killing of insect pests</td>
<td>3.27 ± 0.54</td>
<td>3.83 ± 0.62</td>
<td>-5.51</td>
<td>&lt;0.001**</td>
</tr>
</tbody>
</table>

Source: Survey data; * = Significant (P<0.05); ** = Highly significant (P<0.01)
Data in Table 2 depict that there was a highly significant difference between the pre- and post-FFS scenarios which mean that sufficient improvement was made in the skill and knowledge of farmers regarding crop protection technologies in the study area. However, the difference between identification of pest and predator was ranked 1st with mean values of 3.34 and 3.94, similarly, Seed treatment with fungicides was ranked 2nd with mean values of 3.33, 3.74 and Insect pests control by local recipes was ranked 3rd with mean values of 3.29 and 3.96 in the pre- and post-FFS scenarios, respectively.

The highest difference in the responses regarding Insect pests management with biological control was due to the awareness of the participants obtained during the practical training they undergone in various FFS sessions in the project area. The mean values indicate that perception of farmer respondents regarding all aspects in the pre-FFS conditions ranged from medium to high but tended towards medium in case of post-FFS scenario. The results of the present study are supported by those of Jan et al. (2006) who stated that seed treatment should be encouraged to reduce the incidence of seed and soil born diseases and also partially coincide with those of Mancini et al. (2008) who reported that FFS farmers significantly improved their ability to identify cotton insects, to describe whether the insects were pests or predators, to describe the damage caused by the pest insects, and the predatory habits of beneficial insects after the IPM FFS training, whereas no significant changes were recorded for non FFS participants.

Khatam et al. (2010-b) concluded that that major forms of farmers’ participation in the crop protection activities of FFS was observed in the activities of seed treatment, insect pests identification and insect pests control by local recipes followed mass killing of insects and insect pests’ management with biological control. Tripp et al. (2005) who found that farmer Field School (FFS) approach could improve farmers’ knowledge in pest identification and their timely management and also improve their understanding about agro-ecosystems (AES).

Table 3. Respondents reporting improvement in skill and knowledge regarding various weeds control measures

<table>
<thead>
<tr>
<th>Weed Control Measures</th>
<th>Pre Mean ± SD</th>
<th>Post Mean ± SD</th>
<th>t-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>3.33 ± 0.68</td>
<td>3.78 ± 0.63</td>
<td>-3.72</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>Chemical</td>
<td>3.31 ± 0.53</td>
<td>3.73 ± 0.65</td>
<td>-5.26</td>
<td>&lt;0.002**</td>
</tr>
<tr>
<td>Cultural</td>
<td>3.26 ± 0.56</td>
<td>3.60 ± 0.68</td>
<td>-4.35</td>
<td>&lt;0.001**</td>
</tr>
</tbody>
</table>

Source: Survey data; * = Significant (P<0.05); ** = Highly significant (P<0.01)

Data in Table 3 clearly show that there existed a highly significant difference between pre and post FFS scenarios with respect to manual weed control measure which ranked 1st with mean values of 3.33 and 3.78 followed by chemical and cultural weed control measures which ranked 2nd and 3rd with mean values of 3.31, 3.73 and 3.26 and 3.60 in the pre- and post-FFS scenarios, respectively. The highest difference regarding mechanical weed control measure in the pre- and post FFS scenarios was due to the reason that Mechanical weed control methods are usually more effective. More economical and can cover larger areas per unit of time than other methods. The mean values indicate that perception of farmer respondents regarding weeds control measures in the pre-FFS scenario ranged from medium to high but tended towards medium and tended towards high in case of post-FFS scenario.

The results of the present study are supported by those of Zubair et al. (2009) who reported that manual weeding and application of herbicides significantly reduced weeds per square meter in the experimental area. Jan et al. (2006) pointed out that weeds were to be controlled with the use of proper chemicals whenever needed. Similarly, Porwal, (2000) and Toloraya et al. (2001) stated that weeds were drastically controlled in the treatments with hoeing and herbicides’ application. Khatam et al. (2012) who concluded that participation of farmers in FFS enable them to identify pests and hence control them efficiently, especially through local recipes and Braun and Deborah (2008) who stated that FFS made a significant reduction in environmental risks, augmented agricultural biodiversity, and improved social and decision-making skills and organizational capacity of FFS farmers. An increase of 23% was estimated on FFS farms due to the use of technical knowledge, along with significant increase in recognition of pest and predators, the decision-making capacity and field experimentation.

Winarto (2004), Tripp et al. (2005), and Praneetvatakul (2006) who stated that FFS can be effective in reducing the excessive use of chemical pesticides, lowering the cost of production, improving community health, increasing farmers’ knowledge and preserving agro-eco-system. Rola et al. (2002) who stated that FFS was a season long training of farmers that provides opportunities of participatory activities, experimentation and decision-making regarding field based issues.
### CONCLUSION AND RECOMMENDATIONS

It can be concluded from the study that all aspects of farming were significantly improved as a result of FFS activities in the project area. Therefore, the role played by farmer field schools initiated by the Government of Khyber Pakhtunkhwa is of significant importance. FFS provide opportunities of improving farmers’ capacity in crop production technology, especially in the timely and balanced use of fertilizers, selecting high yielding varieties and getting their soil samples analyzed from the soil testing laboratory. Similarly, during the training in crop protection technology, farmers were sufficiently trained in identification of pest and predator that help them recognize their friend, as well as, enemy insects. FFS impacted positively on seed treatment with fungicides and insect pest control by local recipes, which were also issues of interest for the farmers. Likewise, they gained enough understanding about manual, chemical and cultural weed control measures. In the same way, farmers’ capacity was improved in furrow irrigation technique was due to the learning by doing philosophy of the FFS approach and also may be due to the falling water table in the area that bring them to adopt practices through which water could be efficiently utilized. The mean values indicate that responses of the respondents regarding all aspects in the pre-FFS conditions ranged from medium to high but tended towards medium, whereas tended towards high in case of post-FFS scenario.

The results of the present study are supported by those of Evans (2006) who stated that drip irrigation is a very efficient type of irrigation that applies a slow trickle of water directly to the soil around each plant. The water is emitted through evenly spaced small holes, which are inserted into long, straight, flexible tubes. Different forms of drip irrigation have been used since ancient times in many parts of the world. He added several benefits of drip irrigation, including water conservation, reduced labor, and healthier crops. Drip irrigation saves water by applying it only where it is needed – on the soil around each crop. The slow trickling of water gives the soil time to absorb the water before it is lost to evaporation or run-off. Less labor is required with drip irrigation, because all your crops can be watered at once. Also, drip irrigation reduces weed growth, since a smaller area of soil receives water, as compared to watering crops with a cup or watering can. By using drip irrigation, we can avoid splashing water and soil onto crop leaves. Dirty, consistently moist leaves are much more susceptible to disease.

### REFERENCES


### Table 4. Respondents reporting improvement in skill and knowledge regarding various irrigation practices

<table>
<thead>
<tr>
<th>Irrigation Practices</th>
<th>Pre Mean ± SD</th>
<th>Post Mean ± SD</th>
<th>t-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furrow</td>
<td>3.42 ± 0.62</td>
<td>3.89 ± 0.65</td>
<td>-10.04</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>Drip</td>
<td>3.44 ± 0.56</td>
<td>3.88 ± 0.69</td>
<td>-8.34</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>Basin</td>
<td>3.39 ±0.59</td>
<td>3.86 ± 0.63</td>
<td>-9.32</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>Boarder</td>
<td>3.37 ±0.62</td>
<td>3.84 ± 0.60</td>
<td>-8.33</td>
<td>&lt;0.001**</td>
</tr>
<tr>
<td>Flood</td>
<td>3.34 ±0.56</td>
<td>3.87 ± 0.61</td>
<td>-7.36</td>
<td>&lt;0.001**</td>
</tr>
</tbody>
</table>

Source: Survey data; * = Significant (P<0.05); ** = Highly significant (P<0.01)


