ISSN 1023-1072

Pak. J. Agri., Agril. Engg., Vet. Sci., 2012, 28 (2): 186-198

IMPACT OF FARMER FIELD SCHOOL TRAINING ON FARMERS' KNOWLEDGE AND SKILLS REGARDING RECOMMENDED AGRO-ECOLOGICAL SOUND IPM PRACTICES IN SELECTED DISTRICTS OF SINDH

A. A. Siddiqui[1], Z. A. Mirani[1] and S. S. Bukhari[1]

[1] Department of Agricultural Education Extension and Short Courses
Sindh Agriculture University Tandojam, Pakistan.

ABSTRACT

Present study sought to assess the effectiveness of Farmer field school (FFS) training on farmers' knowledge and skills about agro-ecological sound integrated pest management practices in four districts of Sindh province (Hyderabad, Tando Allahyar, Matiari and Mirpurkhas). In addition, the study examined the performance of the agricultural extension field worker/facilitator in the implementation of the FFS training. The sample size of the study comprised of 432 farmers selecting 144 farmers from each group (trained = 144, exposed = 144 and control = 144). The study used a survey method and employed a questionnaire. The results were analyzed and interpreted. The results indicated that FFS training was a favorable process in increasing knowledge and skills of cotton growing farmers regarding ecologically sound farming practices. Trained group of farmers' perceived that the EFW/F played an effective role during the FFS training. In addition, the results indicated that the FFS graduate shared/transferred little knowledge to non-FFS participants, which is not good sign for the sustainability of the IPM-FFS program. It was therefore suggested that the FFS graduates should be used as a source for transferring the obtained knowledge.

Keywords: Farmer field school, integrated pest management, agro-ecological sound farming.

INTRODUCTION

Pakistan is the territory of cotton (*Gossypium hirsutum* L.) which is a big source of livelihood to around 1.5 million farmers in the rural areas. Cotton is a main source of export capital, accounts for 6.9 percent of value added in agriculture and 1.4 percent of GDP. Pakistan is the world's 4th biggest cotton producing country after China, India, and USA. The world cotton production is projected at 24.8 million tons, during 2010-11 as against 22.01 million tons recorded in 2009-10, estimating an increase of 12.6 percent. Production is expected to continue to increase 11 percent to a record of 27.6 million tons in 2011-12 (GoP, 2011). Despite being one of the largest cotton growing countries, the cotton production in Pakistan is low as compared to other countries. Low cotton production is due to the weather conditions, pests attack and little awareness of applying scientific and pest curbing techniques by farmers.

The timely and optimum use of the pesticides for cotton is essential to prevent the crop from the attack of pests and diseases but the excessive use of the pesticides disrupts the growth of cotton, killing cotton friendly insects and providing opportunity to harmful insects to attack on crop. Also, this throws burden of costs on the growers. Moreover, Farmers use variety of pesticides in cotton to eliminate insects and weeds from their fields, but these limiting agents have the potential to harm our health and the environment (FAO, 2004).The research must provide those methods that are affordable to the farmers and the environment friendly. The FFS approach is based on training needs. The farmers participate in the FFS and become a part of wide scale IPM-FFS programs, ranging from local to national research, and analyze the production troubles and develop solutions for them at the country level (FAO, 2000).

Corresponding author: zamirani@sau.edu.pk

The Farmer Field School (FFS) approach is a training model developed primarily by Food and Agriculture Organization (FAO) in which farmers gain the decision making power regarding use of agro-chemicals at their field. The FFS approach is unique extension season long training conducted at farmers own fields. The approach is action-learning oriented where farmers are allowed to observe, analyze and make alternative decision about their crop (Kingsley, 1999). During four years (2001-2004), Sindh has embraced IPM-FFS as the dominant interface between agriculture extension and farmers. It was assumed that through this new FFS training model, farmers would change their traditional role from passive learner to active learner. The collective research with farmers involves local needs, information about local conditions, local-ecosystem, and weather. The IPM-FFS takes into consideration local needs as well (Linh, 2001).

Various studies regarding IPM-FFS programs were agreed in end that FFS strengthens farmers' ecological knowledge (Thiele *et al.,* 2001; Rola *et al.,* 2002; Feder *et al.,* 2004; Reddy and Suryamani, 2005; Tripp *et al.,* 2005). The information about understanding the crop-ecosystem leads reduction in the pesticides use and at the same time increases production and profit, for instance, in the cotton production systems (Godtland *et al.,* 2004; Khan *et al.,* 2005). On FFS farms, an increase of 23% was estimated in the use of sources of technical knowledge, along with significant increase in recognition of pest and predators, the decision making capacity and field experimentation. Full attendance of FFS sessions by farmers contributed towards learning skills and the making of independent decisions for additional economic gains. FFS farmers joined community organizations in greater numbers (33%) during the post-FFS period (Khan *et al*., 2005). A significant increase in the net contribution (46%) of cotton to net house hold income at FFS farms assisted in reducing the poverty profile. Poverty incidence in FFS farms was reduced from 71% of household below the poverty line to 55% (Khan and Ahmad, 2005).

Since then no follow-up was made, a need therefore was felt to understand what happened to the participants who were enrolled and received FFS-IPM training in cotton during the years 2001-2004 in the season long trainings in Sindh province and thereafter what role agriculture extension has played and what efforts were taken for the sustainability of IPM-FFS since the program was ended. Thus a knowledge gap was apparent in educational circle and this study has to fill this gap by providing information regarding changes that have been taken place on IPM-FFS participants' knowledge and skills regarding the adoption of agro-ecological sound IPM practices in the last several years. The study specifically focused to:

i. assess the level of farmers' knowledge and skills regarding the agro-ecological sound IPM farming practices;
ii. assess the performance of Extension Field Workers/Facilitators in implementing the FFS; and
iii. rank the barriers faced by farmers during the IPM-FFS training.

MATERIALS AND METHODS

Four districts were purposively selected from Sindh province of Pakistan as study area viz., Hyderabad, Tando Allahyar, Matiari and Mirpurkhas, where FFSs were established during 2001 to 2004 for cotton through Nat-IPM Program. The research work was carried out by a structured survey method. The target population of this study was farmers which were categorized into three groups; i.e. Trained Group (IPM-FFS Participants), Exposed Group (Non-IPM-FFS participants but exposed from the IPM-FFS villages), and Control Group (farmers who neither involved in IPM-FFS nor living in IPM-FFS village). The population was selected from Agro-ecological zone B2 of the Sindh Province i.e. Perennial Sukkur barrage of command area (cotton/wheat zone of left bank) as provided in a report of FAO, 2003 reported by Azad (2003).

The sample was selected from each group on the basis of tables (Fitz-Gibbon and Morris, 1987). The 144 sample size from Trained Category (36 from Hyderabad District, 36 from Tando Allahyar District, 36 from Matiari District and 36 from Mirpurkhas) was selected. Similarly, the sample of 144 farmers (Exposed Group) was randomly selected from the same IPM-FFS villages and 144 farmers (Control Group) were randomly selected from the villages having at least a minimum distance of 20 Kilometers from IPM-FFS

village where sufficient cotton growing farmers were available. The total sample size of farmers' category hence comprised a total of 432 farmers.

A detailed questionnaire was developed in consultation with the local/foreign IPM-FFS experts and help of available literature. Questionnaire was finalized after incorporating the valuable suggestions/recommendations received from the local and foreign experts. The concepts or ideas were usually measured through different statements on a continuum ranging from negative to positive. Despite several efforts, a total response rate (about 94%) was obtained. More than 60% response rate is sufficient for comparison between two or more than two groups and for the validation of the research results (Wunsch, 1986). All the data were computed and analyzed using appropriate statistical analysis techniques and IBM-SPSS version 19 was used for data analysis. Frequency, mean, percentage and standard deviation were calculated. For the comparison among groups, ANOVA was performed and Duncan Multiple Range Test (DMRT) was applied to rank the means.

RESULTS AND DISCUSSION

Demographic information

The demographic characteristics of the sampled farmers are presented in Tables 1 and 2. The maximum age of the trained, exposed, and control group farmers was 55, 57, and 54, respectively. Trained farmers had a maximum of 35 years of farming experience. The maximum landholding of all the category of farmers was 49 (trained), 40 (exposed), and 51 (control) acres, respectively. The maximum area under cotton cultivation was 40 acres for the trained group. A largest number of trained farmers (48.1%), exposed farmers (56.3%), and control group of the farmers (52.6%) were Haree (tenants). The educational level of farmers was good with more than 50% of the trained group and exposed group had above the primary level of education. A simple majority (44.4%) of the trained farmers were relying on both canal and tube well irrigation.

Table 1. Demographic profile of the farmers.

Characteristics	Trained Farmers		Exposed Farmers		Control Farmers	
	max	min	max	min	max	min
Age (in years)	55	19	57	13	54	11
Farming Experience (in years)	35	8	33	4	39	11
Farm Size (in acres)	49	20	40	15	51	22
Area Under Cotton (in acres)	40	10	34	11	33	8

Level of farmers' knowledge and skills

Awareness of technologies used in crop protection and production plays vital role in the successful agricultural farming. The farmers were interviewed to record their opinions on an identified set of agro-ecological sound IPM practices in the field and their responses are presented in Table 3. Their responses were recorded using a five points likert scale (i.e. 1 = Strongly disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, 5 = Strongly agree). The ANOVA result shows that the trained farmers had better knowledge then the exposed and control group of farmers. The result shows a significant difference between the groups on the following agro-ecological farming practices:

- Summer deep ploughing helps in the soil moisture conservation and kills pests due to the sun exposure.
- Early sowing reduces the risk of the influence of pest incidence in cotton.
- The proper plant spacing influences on yield and reduces the input cost.
- Delinting of cotton seed by acid increases the permeability of seed coat & gives high seed germination.
- Bird perches are useful practices to decrease the pest population and it requires very less investment.

- Release of trichogramma is effective method to control pest and it helps to obtain maximum yield.
- Hand collection of larvae is low cost pest management strategy which helps in reducing pest load.
- Use of neem extract is an environmentally safe and effective pest management strategy.
- Hand weeding of weeds is one of the best practices to control insect pest.
- Defoliation practice improves the picker efficiency and also effective to control late season insects.
- De-topping practice increases the propagative growth and helps to reduce the pest load.
- Crop residue destruction provides the safety from hidden pest and reduces the pest infestation.

However, the ANOVA results show no significant differences in the knowledge between the groups for the following agro-ecological practices:

- Crop rotation in cotton helps to maintain the soil fertility and reduces soil erosion.
- Intercropping system in cotton increases the income and reduces the pest population.
- Resistant and tolerant varieties are the only means to avoid all types of pests and diseases.
- Pheromone traps are used for monitoring and controlling insect pest.
- Yellow sticky traps are used for observing and controlling insect pest.

Farmers level of skills regarding agro-ecological sound farming practices

The sample farmers were asked to perceive their skills level on agro-ecological sound farming practices. Various skills considered necessary for agro-ecological sound IPM practices were identified and farmers were asked to record their responses on a five points likert scale (1 = Extremely Unconfident, 2 = Unconfident, 3 = Neutral or Unsure, 4 = Somewhat confident, 5 = Extremely confident) and the results are presented in Table 4. A significant difference between the trained, exposed, and control groups was found on almost all the skill statements except “gap filling and thinning” statement.

Table 2. Tenancy level, educational level, and sources of irrigation.

Characteristics	Category	Trained Farmers		Exposed Farmers		Control Farmers	
		F	P	F	P	F	P
Status	Land Lord	26	19.3	16	11.9	19	14.1
	Haree	65	48.1	76	56.3	71	52.6
	Lease Holder	10	7.4	12	8.9	16	11.9
	Owner-Cultivator	34	25.2	31	23.0	29	21.5
Educational level	Illiterate	26	19.3	33	24.4	35	25.9
	Primary	37	27.4	32	23.7	31	23.0
	Middle	24	17.8	22	16.3	21	15.6
	Matriculate	11	8.1	16	11.9	13	9.6
	Intermediate	13	9.6	13	9.6	17	12.6
	Graduate	15	11.1	12	8.9	14	10.4
	Post Graduate	9	6.7	7	5.2	4	3.0
Sources of Irrigation	Canal Irrigation	66	48.9	67	49.6	74	54.8
	Tube Well Irrigation	9	6.7	11	8.1	15	11.1
	Both	60	44.4	57	42.2	46	34.1

Table 3. Comparative farmers level of knowledge regarding agro-ecological sound IPM practices.

Agro-Ecological Sound IPM Practices	Trained Farmers		Exposed Farmers		Control Farmers		F. Value	Sig.
	M	SD	M	SD	M	SD		
Summer deep ploughing helps in the soil moisture conservation and kill pests due to the sun exposure.	4.10_{b}	0.86	3.81_{a}	0.95	3.81_{a}	0.84	4.642	0.010*
Early sowing reduces the risk of the influence of pest incidence in cotton.	3.72_{b}	1.00	3.56_{ab}	1.05	3.33_{a}	1.01	4.800	0.009**
The proper plant spacing influences on yield and reduces the input cost.	4.01_{b}	0.84	3.81_{ab}	0.85	3.69_{a}	0.94	4.472	0.012*
Crop rotation in cotton helps to maintain the soil fertility and reduces soil erosion.	3.67_{b}	0.99	3.38_{a}	1.26	3.42_{ab}	0.96	2.946	0.054^{NS}
Intercropping system in cotton increases the income and reduces the pest population.	3.33_{b}	1.07	3.17_{ab}	1.15	3.03_{a}	1.13	2.483	0.085^{NS}

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Resistant and tolerant varieties are the only means to avoid all types of pests and diseases.	3.20_{a}	1.02	3.27_{a}	1.03	3.13_{a}	1.04	0.561	0.571^{NS}
Delinting of cotton seed by acid increases the permeability of seed coat & gives high seed germination.	3.80_{b}	0.96	3.66_{b}	0.97	3.39_{a}	1.00	5.956	0.003**
Pheromone traps are used for monitoring and controlling insect pest.	3.60_{b}	0.91	3.45_{ab}	0.92	3.32_{a}	1.02	2.947	0.054^{NS}
Yellow sticky traps are used for observing and controlling insect pest.	3.34_{b}	0.99	3.20_{ab}	0.93	3.09_{a}	0.96	2.306	0.101^{NS}
Bird perches are useful practices to decrease the pest population and it requires very less investment.	3.66_{b}	0.89	3.16_{a}	0.92	3.12_{a}	0.90	14.908	0.001**
Release of trichogramma is effective method to control pest and it helps to obtain maximum yield.	3.56_{b}	0.87	3.45_{ab}	1.04	3.24_{a}	1.04	3.424	0.034*
Hand collection of larvae is low cost pest management strategy which helps in reducing pest load.	3.90_{c}	0.78	3.47_{b}	0.95	3.19_{a}	1.12	18.299	0.001**
Use of neem extract is an environmentally safe and effective pest management strategy.	4.01_{b}	0.87	3.73_{a}	0.91	3.52_{a}	0.97	9.828	0.001**
Hand weeding of weeds is one of the best practices to control insect pest.	3.94_{b}	0.76	3.59_{a}	0.90	3.50_{a}	0.99	9.275	0.001**
Defoliation practice improves the picker efficiency and also effective to control late season insects.	3.78_{c}	0.88	3.55_{b}	0.95	3.30_{a}	0.98	8.536	0.001**
De-topping practice increases the propagative growth and helps to reduce the pest load.	3.62_{b}	0.85	3.53_{ab}	0.90	3.33_{a}	1.03	3.575	0.029*
Crop residue destruction provides the safety from hidden pest and reduces the pest infestation.	4.11_{b}	0.76	3.87_{a}	1.01	3.75_{a}	1.09	4.907	0.008**

Means and SD are calculated using the scale: 1 = Strongly Disagree 2 = Disagree 3 = Undecided 4 = Agree 5 = Strongly Agree

^{NS} = Non-significant, * = Significant at 0.05 level of significance, ** = Significant at 0.01 level of significance

Values in a column with different superscripts are significantly different ($P < 0.05$), as assessed by ANOVA and Duncan's Multiple Range Test.

Table 4. Comparative farmers level of skills regarding agro-ecological sound farming practices.

Skills in Agro-Ecological Sound IPM Practices	Trained Farmers		Exposed Farmers		Control Farmers		F. Value	Sig.
	M	SD	M	SD	M	SD		

Acid delinting/seed treatment	3.64_{b}	0.95	3.41_{b}	1.11	3.05_{a}	1.19	10.097	0.001**
Installation of bird perches	3.53_{c}	0.99	3.02_{b}	1.18	2.59_{a}	1.26	22.410	0.001**
Use of pheromone traps	3.22_{b}	1.05	2.76_{a}	1.23	2.66_{a}	1.24	8.808	0.001**
Fixing yellow sticky traps	2.96_{b}	1.18	2.80_{ab}	1.19	2.53_{a}	1.14	4.761	0.009**
Installation of light traps	3.19_{b}	1.06	2.84_{a}	1.07	2.72_{a}	1.20	6.571	0.002**
Release of trichogramma	3.46_{b}	0.99	3.25_{b}	1.09	2.84_{a}	1.30	10.158	0.001**
Preparation of neem extract	3.76_{b}	0.86	3.56_{b}	0.94	3.29_{a}	1.18	7.318	0.001**
Preparation and spray of detergents	3.96_{c}	0.88	3.39_{b}	1.00	3.01_{a}	1.09	31.013	0.001**
Defoliation technique	3.58_{b}	0.95	3.41_{b}	0.98	3.04_{a}	1.14	9.469	0.001**
De-topping technique	3.55_{b}	0.96	3.39_{b}	0.91	2.99_{a}	1.14	10.732	0.001**
Gap filling and thinning	3.82_{a}	0.80	3.87_{a}	0.86	3.70_{a}	1.03	1.251	0.287
Inter-culturing and weeding by hands	4.22_{b}	0.78	3.68_{a}	0.99	3.71_{a}	1.04	13.841	0.001**
Removal of infested plant	4.30_{b}	0.78	3.73_{a}	0.97	3.77_{a}	0.95	16.709	0.001**
Conducting trials/experiments	3.48_{c}	1.15	2.64_{b}	1.09	2.27_{a}	1.01	43.485	0.001**

1 = Extremely Unconfident 2 = Unconfident 3 = Neutral or Unsure 4 = Somewhat Confident 5 = Extremely Confident

^{NS} = Non-significant, * = Significant at 0.05 level of significance, ****** = Significant at 0.01 level of significance

Values in a column with different superscripts are significantly different ($P < 0.05$), as assessed by ANOVA and Duncan's Multiple Range Test.

Performance of extension field worker/facilitator (EFW/F)

The regularity of EFW/F in IPM-FFS training was investigated through farmer respondents' (trained group) interviews and farmers were invited to perceive about EFW/F regularity using a five points likert scale (e.g. 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Always), and the responses are reported in Table 5. The data show that 99.3 percent of the EFW/F conducted IPM-FFS activities regularly.

Table 5. Farmer perceptions with regard to EFW/F regularity in IPM-FFS training.

Never		Rarely		Sometime		Often		Always		M	SD
F	P	F	P	F	P	F	P	F	P		
0	0	0	0	0	0	1	0.7	134	99.3	4.99	0.08

Farmers' perception with regard to IPM-FFS activities conducted by EFW/F

Various activities were conducted by the EFW/F during IPM-FFS training. Farmer respondents were invited to perceive on the identified activities. Responses of the farmers were recorded using a five points likert scale (e.g. 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Always), and the results are reported in Table 6. The mean ranking showed that a vast majority of farmers perceived that most of the identified activities were conducted "always" to "often" by the EFW/Fs.

Table 6. Farmers' perception regarding activities conducted by EFW/F during IPM-FFS training.

IPM-FFS Activities	M	SD
Review of Previous Session	4.55	0.88
Cotton Eco System Analysis (CESA)	4.98	0.14
Field Trials/Experiments	4.09	1.06
Insect Zoo	4.28	0.91
Energizer	3.83	1.04
Sheet Preparation and Presentation	4.94	0.26
Group Discussion	4.61	0.78
Special Topic	3.41	1.12
Group Dynamic Exercise	3.91	1.06

Session Review	4.59	0.81

Farmer perceptions regarding overall performance of EFW/Fs

The respondents instigated to perceive with regard to the performance of EFW/F at IPM-FFS and various performance related statements were developed and offered to the respondents to comment. In most cases, majority of farmers agreed that EFW/Fs did perform their work in an effective manner during FFS training (Table-7).

Ranking of barriers faced by farmers during IPM-FFS training

The ranking of barriers/constraints faced by the farmers during IPM-FFS activities was developed and according to the farmers' perception (Table 8) 'IPM-FFS activities being difficult and time consuming' has been the top ranking barrier; while 'no extra benefit of adopting agro-ecological sound IPM practices' ranked 2nd and 'lack of participatory approach among farmers during IPM-FFS training' ranked as 3rd most important constraint at IPM-FFS activities. Participants lost interest in IPM-FFS training due to strict and hectic schedule was a barrier ranked 4th and as perceived by the farmers the 5th ranking barrier was that the facilitator usually not replied the questions so it was embracing for farmers participating in IPM-FFS training. However, another important constraint as perceived by the farmers (rank 6th) was the influence of pesticide dealers that discouraged FFS participants to follow IPM practices.

Table 7. Farmers' perceptions with regard to performance of EFW/F performed in IPM-FFS training.

Statements About EFW/F Performance	M	SD
EFW/F seemed active and energetic during conducted the IPM-FFS.	4.09	0.62
EFW/F involved himself and was flexible in participation in all IPM-FFS activities.	4.14	0.72
EFW/F conducted IPM-FFS activities step by step and in an organized manner that farmers felt easy.	3.97	0.76
EFW/F used appropriate methods and kept focus on the IPM-FFS continuing activity.	3.93	0.73
EFW/F used practical examples for understanding of farmers and to stimulate discussions.	3.76	1.011
EFW/F used the energizers/group dynamics exercises and ice breakers in an appropriate time.	3.92	0.97
EFW/F created space for every participant to involve in discussions through brain storming.	3.87	0.93
EFW/F tried to manage time properly to complete IPM-FFS activities in set schedule.	3.87	0.86
EFW/F also monitored and evaluated the IPM-FFS to achieve the objectives.	3.67	1.12
EFW/F dealt very softly and politely throughout the IPM-FFS that farmers respected him a lot.	4.07	0.60
EFW/F communicated with the farmers in a local language that farmers picked up easily.	4.19	0.82
EFW/F believed in two ways communication process so that farmers didn't hesitate.	4.07	0.72
EFW/F involved farmers in decisions making process through participatory approach.	3.87	0.95
EFW/F listened to questions completely and carefully than he answered.	4.12	0.76
EFW/F always responded to question timely and in a consistent manner.	3.80	1.03

EFW/F identified and resolved the issues of farmers related with the IPM-FFS.	3.91	0.91

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EFW/F really handled and resolved the conflicts among farmers very professionally.	3.87	0.84
EFW/F accepted criticism for self appraisal and tried to improve his facilitation skills.	4.00	0.86
EFW/F attitude was neutral and natural with FFS participants.	4.24	0.88
EFW/F appreciated and encouraged the farmers to build their confidence.	3.90	0.86
EFW/F had an ability to interact with all farmers and kept them active during the entire session.	3.95	0.97
EFW/F showed his full cooperation with the farmers during the entire IPM-FFS.	4.10	0.87
No doubt that EFW/F was a well trained and technically sound.	4.02	0.79

Table 8. Ranking of barriers/constraints faced by farmers during IPM-FFS.

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

CONCLUSION

Pesticides have played an important role in enhancing crop yields through the effective control of insect pests. However, the indiscriminate use of pesticides has caused serious health hazards to human health and environment. Cotton crop exclusively accounts for nearly 60% of the total consumption of pesticides. The pesticides and the herbicides have helped to control insect pressure and weeds (Hanif *et al.,* 2004). Plant protection measures presently depend mostly on the use of pesticides. The use of pesticides has grown a lot, in 1982 it was 5000 MT, in the year 2005 it reached 100,000 MT and in 2006, a minor change accrued in the consumption of toxic pesticides (GoP, 2008). In order to reduce the cost of production by way of minimizing the use of inputs such as pesticides, IPM-FFS program for cotton was launched in Sindh during the year 2001-2004. However, no follow up was made to reveal the fact what happened to those participants who were trained in those FFS. Therefore, the present study was designed to study the effectiveness of IPM based FFS school in four districts of Sindh Province. Study found that FFS is an effective approach in increasing farmers' knowledge and skills regarding the agro-ecological sound IPM practices of cotton. However, the level of knowledge for the exposed and control group was not significant indicating that the trained farmers were not sharing these practices with other farmers which threatened the sustainability of FFS programs in Sindh. In addition to that, trained farmers perceived that EFW/Fs performed effectively during the implementation of IPM-FFS in the year 2001-2004 which shows a trust of farmers FFS has developed. The Agriculture Extension Wing can transform this trust into an effective relationship building and can continue to disseminate other sustainable programs to farming community.

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(Received 14 March, 2012; Revised 04-12-2012)