Research Article

Awareness and Adoption of Integrated Pest Managemet in Cotton by Growers of Hasilpur Area in Pakistan

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Abstract | Rural communities depend upon cotton as cash crop for their livelihood. Agro-based industries are depending upon its yield. Our per acre cotton yield is still far behind than the developed countries. Integrated pest management project was launched in Punjab and run by agriculture extension department. Farmer Field Schools were formed at each village level. Present study was designed to evaluate the role of integrated pest management for cotton production technologies by the registered growers of Hasilpur, Punjab. In order to collect this information an interview schedule was prepared and respondents (150 growers of farmer field school) were interviewed personally by the author. The findings revealed 98.7%, 100% and 98% cotton growers were aware of hoeing, leaf curl virus and biological control of insects-pests. Before integrated pest management all the farmers used pesticides haphazardly while 1.3% used after it. 90.7%, 86.7% and 97.3% farmers were aware of economic threshold level of harmful insects, use of pesticides at economic threshold level and clean cotton picking respectively. 94.7% growers adopted thinning of plants, 91.3% knew pest scouting, 87.3% used pesticides after pest scouting while 74% farmers used pesticides both at morning and evening. It was concluded that integrated pest management project enhanced the skills of farmers and resulted in higher yields of quality cotton through reduction of pesticides sprays.

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Introduction

Two third population of Pakistan is living in rural areas and are engaged in agriculture. It accounts for 20.9% of the Gross Domestic Product and a source of livelihood of 43.5 percent of rural population. Cotton is the major cash crop and life of millions of farmers is dependent on it. Its production accounts for 1.5 percent in GDP and 7.1 percent in agriculture value addition. Cotton production remained higher since 2004-05 due to government's provision of aggressive farmer training for small farmers and extension services (Government of Pakistan 2014-15). Climatic conditions are highly favorable for cotton production. But due to unawareness and no adoption of latest cotton production technology its yield per acre is too low. In Pakistan, agriculture extension department is engaged in helping the farming community to increase the productivity and improve the living standards through many extension programs (Abbas et al., 2009; Farooq et al., 2010). Integrated pest management is general approach to reduce the

losses from pests in ways that are effective, economically sound and ecologically compatible (Wijnands, 2012). The unwise and indiscriminate use of pesticides had resulted in resistance development in insects and resurgence of new pests besides environmental pollution and public health hazards (Gibbons et al., 2015). Farmer Field School was the effective approach and developed first time in Indonesia in 1989 (Davis et al., 2010) and was the efficient means of extension education which increased the decision making power of the growers and led to get more higher quality yields than non-FFS farmers (Gwary et al., 2015). Keeping in view, Government. of Punjab had launched four years integrated pest management project in five districts of Punjab *i.e.* Lodhran, Vehari, Khanewal, Dera Gazi Khan and Bahawalpur. The main objectives of the project were to raise awareness among the farmers about the dangers of only reliance on chemical control, emphasizing the IPM options for pest control, increase in cotton production through reducing the cost benefit ratio. Demonstration plot of 02 Acres (One Acre IPM and one Acre of Farmer) were used in each FFS for conduction of Agro-Eco-System Analysis (AESA) (GoP, 2005-06). At farmer field school, farmers learned to carry out experiments, identify insects-pests and made recommendations based on Cotton Eco- System Analysis (CESA) (Mallah and Akram, 2007). The integration of bio-control agents with recommended insecticides proved as effective and economical control tactic (Hassan et al., 2007; Beers and Schmidt, 2014). Habib et al. (2007) concluded that best agricultural practices had brought a positive change in the attitude of the FFS farmers. Haq et al. (2008) concluded that almost 71% of cotton growers were in a position to identify the insects and damage caused by them. It was found that 75% of cotton growers had orientation about side effects of pesticides, whereas 94% of respondents were involved in pesticide using practices. Ashraf et al. (2009) concluded that farmers learned by doing and became independent decision makers. Integrated pest management practices resulted in drastic reduction of pesticides use and stabilized cotton yield (Mayee et al., 2008). Farmer field school resulted in the capacity building of farming community and farmers practiced balanced use of fertilizers and insect pest identification were ranked 1 with mean value 3.40 and 3.22. Weeds controlled with chemicals and manually were ranked 1 and 2 with mean values 2.99 and 2.97 respectively (Khatam et al., 2013). Muhammad et al. (2013) studied pre and post FFS aspects and concluded that FFS had a significant effect to improve the social being of farmers. Different aspects like confidence building and spirit of help, decision making and spirit of self-help were significantly impacted in positive way due to post FFS. Siddiqui et al. (2012) confirmed that FFS was proved to be effective training programs for the cotton growers according to eco-system friendly tactics. This approach transferred the obtained knowledge to non FFS farmers. Zahid et al. (2013) concluded that registered growers of FFS who were less than 40 years old had got maximum output than other age groups. Farmers in this age group had increased their cotton yields from 800-1000 kg per acre in pre and post FFS analysis. Keeping in view the community integrated pest management project is striving for creating awareness regarding cotton production technologies among its registered growers. Therefore the present study was designed with objective to assess the knowledge level of registered growers about cotton production technology and the role of Community Integrated Pest Management project.

Materials and Methods

The impact of integrated pest management was studied in tehsil Hasilpur of district Bahawalpur. There are 15 union councils and 108 villages in tehsil Hasilpur. The population consists of all the registered growers of farmer field schools. The lists of the farmers of FFS were obtained from the office of Deputy District Officer Agriculture (Ext.) Hasilpur.

The sample for the study

One Farmer Field School comprised of 25 farmers. One FFS from each union council was selected at random. So, 10 farmers from each FFS were selected randomly, thereby making a sample size of 150 respondents.

Instrumentation

Interview schedule was developed by the researcher from the synthesis of related literature reviewed, personal insights and discussions with knowledged and experienced professionals in the discipline of Agricultural Extension Education.

Data collection and analysis

Data collection was accomplished through the use of interview schedule. The registered growers were interviewed by author personally at their farms or homes. Although the interview schedule was constructed in

English, yet the questions were administered in Urdu and Punjabi language for the convenience of interviewees to get the required accurate information. The data were analyzed statistically by using statistical package for social sciences (SPSS).

Results and Discussion

In farmer field school, farmers were taught about cotton production technology in order to conserve natural fauna, use of optimum resources at critical stage of cotton to ensure maximum yield. The data were collected about weeds control, thinning, knowledge about biological control, use of haphazard pesticide sprays, awareness about economic threshold level, use of pesticide sprays at economic threshold level, pest scouting, timings of spray, awareness about cotton diseases and clean cotton picking.

Table 1: *Distribution of IPM farmers with regard to method adopted for weed control (n=150).*

Weed control	Awareness		No Awareness	
	Number	%	Number	%
Dab Method	6	4.0	144	96.0
Hoeing	148	98.7	2	1.3
Chemical Control	91	60.7	59	39.3
Not Control	0	0.0	150	100.0
Any other	0	0.0	150	100.0

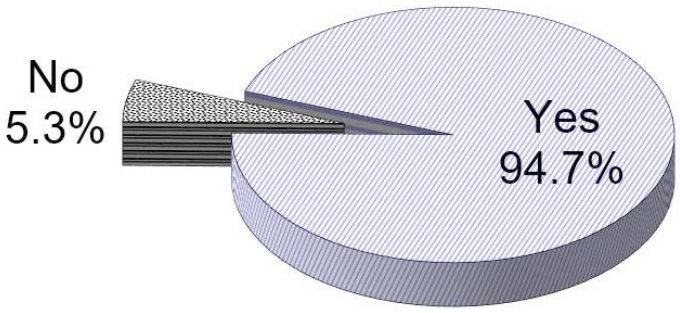

Figure 1: *Distribution of IPM farmers with regard to adoption of thinning (n=150).*

Agronomic practices: Results revealed 98.7% registered growers adopted hoeing while 4.0%, 60.7% adopted dab and chemical control respectively (Table 1). Khatam et al. (2013) findings which are dissimilar to present outcomes that chemical and manual control of weeds were ranked 1 and 2 with mean values 2.99 and 2.97. Majority (94.7%) of registered growers adopted thinning practices followed by 5.3% who did not adopt it (Figure 1). Siddiqui et al. (2012) reported the results which are in similar trends and recorded that weed control manually was the best method among all and thinning practice was adopted in better way by the trained farmers.

Biological control: Majority (98%) of registered growers had knowledge to some extent level about biological control of insect-pests while 2% had abundant knowledge while no one falls in no knowledge category (Figure 2). Khatam et al. (2013) reported that biological control of insect-pests was ranked 6 with mean value of 2.59. However, it was the entirely new approach for the farmers because they had no knowledge about it before this project.

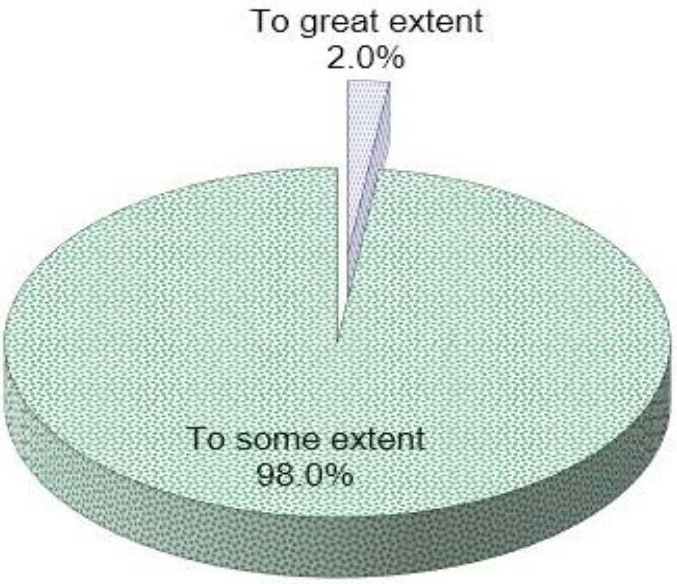

Figure 2: *Distribution of IPM farmers with regard to the extent of knowledge level of FFS farmers about biological control of harmful insects of cotton (n=150).*

Table 2: *Distribution of IPM farmers with regard to haphazard use of pesticides sprays before adopting IPM and after IPM. (n=150).*

Use of pesticides sprays	Before IPM		After IPM	
	Number	%	Number	%
Yes	150	100.0	2	1.3
No	0	0.0	148	98.7
Total	150	100.0	150	100.0

Chi-square = 292.11 (p=0.000) d.f = 1

Plant protection measures: Before IPM project 100% farmers used pesticides sprays haphazardly and had no knowledge of economic threshold level and right spray timings. But after project the majority (98.7%) of farmers did not use pesticides haphazardly (Table 2). The outcomes of Islam ul Haque, (2015) are in consistence that the indiscriminate use

of pesticides in Pakistan resulted in more than 70% pesticides consumption in cotton crop. The majority (90.7%) of registered growers were aware about economic threshold level of harmful insects of cotton (Figure 3). Majority (86.7%) of registered growers used pesticides sprays at economic threshold levels of harmful insects of cotton (Figure 4). Maximum number of registered growers (91.3%) had knowledge about pest scouting and 87.3% were used pesticides after conducting pest scouting (Table 3). A large majority (74%) of registered growers sprayed at both morning and evening times while 12.0% at the morning and 14.0% at evening time (Table 4). Zahid et al. (2013) reported similar trend of findings that number of pesticides sprays reduced after adoption of integrated pest management and resulted in higher cotton. Hundred percent respondents were aware about cotton leaf curl virus disease and 72%, 30.7%, 86.0%, 18.0%, 24.0% about tirk, leaf spot, root rot, stem rot and other diseases (bacterial blight etc.) (Table 5).

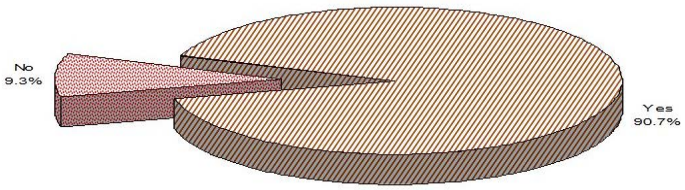

Figure 3: *Distribution of IPM farmers with regard to awareness about economic threshold level (ETL) of harmful insects (n=150).*

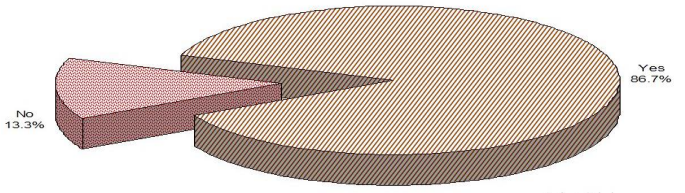

Figure 4: *Distribution of IPM farmers with regard to use of pesticides sprays at ETL (n=150).*

Table 3: *Distribution of IPM farmers with regard to pest scouting and use of pesticide after pest scouting (n=150).*

Response	Yes		No	
	Number	%	Number	%
Know about pest scouting	137	91.3	13	8.7
Use of pesticide after pest scouting	131	87.3	19	12.7

Clean cotton picking

Registered growers picked clean cotton which was the core component of the project. The majority (97.3%) of them picked clean cotton while 2.7% did not (Table 6).

Table 4: *Distribution of IPM farmers with regard to spray timings in cotton (n=150).*

Spray timings	Number	%
Morning	18	12.0
Noon	0	0.0
Evening	21	14
Morning & Evening	111	74

Table 5: *Distribution of IPM farmers with regard to awareness of diseases of cotton (n=150).*

Diseases	Awareness	Percentage
Leaf Curl Virus	150	100.0
Tirk	108	72.0
Leaf Spot	46	30.7
Root rot	129	86.0
Stem rot	27	18.0
Bacterial Blight	36	24.0

Table 6: *Distribution of IPM farmers with regard to clean cotton picking (n=150).*

Clean cotton picking	Number of respondents	Percentage
Yes	146	97.3
No	4	2.7
Total	150	100.0

Conclusions and Recommendations

The majority of the registered growers adopted hoeing, thinning and had knowledge about cotton leaf curl virus disease. Majority of them had awareness about biological control, economic threshold levels of insects-pests and applied pesticide sprays at economic threshold levels of insect-pests after conducting pest scouting. Majority of farmers used pesticides sprays at morning and evening. After this project no farmer used pesticides haphazardly and they picked clean cotton. It is concluded that integrated pest management project brought a clear cut change in the awareness and adoption level of all agronomic and plant protection measures and ultimately ensured less number of sprays and an increase in the existing cotton yields per acre. The integrated pest management project should be expanded in all cotton growing districts of Punjab province. Moreover, it is also be recommended that extension staff must be equipped with the latest information technology tools and their incentive based performance will ensure dissemination of latest information to the farmers at their door steps.

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Author's Contribution

Muhammad Zahid: Planned the study, conducted the research and wrote the manuscript.
Muhammad Ather Javed Khan: Supervised the research, engaged in planning and conducting the research, analysed the data and finalized this manuscript.
Muhammad Idrees and Ahmad Kamran Khan: Helped in planning the research and gave input during the course of this study. He also reviewed the manuscript.

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