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ESTABLISHMENT OF INTEGRATED PEST MANAGEMENT (IPM) IN COTTON THROUGH FARMER FIELD SCHOOL (FFS) IN SAKRAND, SINDH, PAKISTAN

GHULAM HUSSAIN MALLAH AND AKRAM KHAN KOREJO

Senior Scientific Officer, Entomology,
Central Cotton Research Institute, Sakrand, Pakistan.

Abstract

Under the guidance of National IPM project FFS activities were carried out in Sakrand Sindh during 2003. This programme made a visible impact on farmers understanding of IPM. Farmer Field School (FFS) are field based season long learning experiences for 25 farmers. One of the main reason for the success of this approach is that the decisions are not preplanned and are not dictated from a central command, but are based on the analysis of agro ecosystem and site situation and are made by the farmers with the help of Facilitators. Sustainable profitable and environmentally sound production of cotton through the development promotion and practice of IPM by farmers is the ultimate objective of this programme. From these studies it was concluded that IPM plot provided 25% more yield and a net amount of RS 3705 (38.03% profit increase over growers plot).

Introduction

Cotton crop is attacked by many insects and mites. It is estimated that about 20-40% loss is occurring annually due to different pests of cotton. This has resulted in the increased use of pesticides. Latest figure shows that nearly 46000 tons of pesticides were used in 2000, about 60% of which was used on cotton which has created many problems. These included development of resistance to pesticides by major insect pests, environmental pollution and problems of health hazards and residues in food chain.

Major pests of cotton in Sindh are Thrips, *Scirotothrip dorsalis* Hood, *Thrips tabaci*, Lindman, Jassid, *Amrasca devastans* (Dist), Whitefly, *Bemisia tabaci*-(Gennadius), Spotted Bollworms, *Earias vittella* F.Spiny Bollworm, *Earias insulana* (Boisd), Pink Bollworm, *Pectinophora gossypiella* (Saunders), American Bollworm, *Helicoverpa armigera* (Hub) and Army worm, *Spodoptera litura* (Fab).

Alternatives of this approach are available like Integrated Pest Management (IPM) system, which is economically viable. It is not profitable then is not sustainable. Sustainable agriculture involves the successful management of resources for agriculture to satisfy changing human needs, while maintaining the quality of the environment and conserving natural resources.

There has been a lot of research in this area elsewhere as well as in Pakistan however the transfer of this approach remains a bottleneck. The world experience over the years has shown that the best way for the transfer of technology practice is through Training of Facilitators and Farmer Field School (FFS) activities, which form the core of the cotton IPM programme (Anon., 2002).

To evaluate the general cotton crop condition and farm level cotton production practices, survey of cotton crop was conducted by G.H. Mallah (1996) in various parts of cotton growing districts of Sindh and observed that 50% of them were able to identify the insect pests. Generally the farmers sprayed their crop 3-4 times and in some cases 3-8 sprays were done mostly with hand sprayer. The main crop rotation observed was cotton wheat-cotton. The source of irrigation was 75% canal water.

Materials and Methods

The main aim of the studies was to compare the farmers practices versus IPM techniques and to motivate the growers towards the implementation of Integrated Pest Management (IPM) approach by doing all the practices by themselves. Apart from above mentioned objectives, one of the aims of this approach/practices was to provide training and demonstration of the IPM approach not only to the growers, where the plot/experiment was carried out but also to the growers of surrounding areas too. The experiment was carried out in two acres area in grower's field at Pai farm Sakrand. Trial was sown on 25-5-2003. Seed of NIAB-78 was sown. To record pest and their natural enemies, observations were recorded at weekly intervals. For sucking pests, 30 leaves per plot were observed, selected randomly from top, middle and bottom portions of the plants whereas, for bollworm and natural enemies, common stick sample method was used and 4 samples per plot were taken.

Results and Discussions

Pest and predator population noted from the experiment summarized in Table 1 indicated that, population of thrip, jassid was above the Economic Threshold level (ETL) during July and August in both the experiments (IPM Plot and Farmers practice plot). Maximum population of thrip was recorded during 2nd week of July in both the plots. Highest population of jassid (2.18/leaf) was recorded during 2nd week of August in FP plot and 1.46/leaf during 3rd week of August in IPM practices plot. Population of whitefly remained below ETL in both the plots. Maximum bollworm damage (15.50%) was recorded during 3rd week of August in Farmers practices plot and 12.5% in IPM plot during 2nd week of September. Maximum number of natural enemies 37000/acre were recorded from IPM Plot in comparison to 26000/acre in growers plot during 1st week of September. Because the grower sprayed the crop during that time against bollworm that resulted in reduction in population of natural enemies. In spite of applying pesticide, IPM plot provide 24.40% more yield increase over farmers practices plot.

Availability of predators of cotton pests: In Australia upto 450 different species have been recorded in unsprayed fields (L. Wilson unpublished) and a significant portion of these are beneficial. It is striking that the key beneficial groups in cotton are similar in many parts of the world (Hearn & Fitt 1992) but their impacts and value have often proved difficult to demonstrate. We need to recognize there are often severe limitations in the capacity of beneficial to control some pests, particularly the Heliothines. These pests are highly mobile, highly fecund, well adapted to exploit diverse cropping systems (Fitt 1989, 1994) and capable of explosive infestations of crops. Beneficial are often not sufficiently abundant in cotton crops at the times when *Helicoverpa* appear to minimize damage. Since most beneficial are easily disrupted by pesticides (Wilson *et al.*, 1998) and populations may be slow to recover, there is little evidence that beneficial can effectively control *Helicoverpa* species.

Results in Table 2 show the details of expenditure incurred on IPM plot and growers plot and the cost benefit/economic analysis. In IPM plot no any pesticides were applied; however, grower applied one spray against bollworms, but even then IPM plot provided 25% more yield and a net amount of Rs. 3705 (38.03% profit increase over growers plot).

Table 1. Population of sucking pests, bollworm and natural enemies recorded from IPM Plot and growers practices plot during 2003.

Month/ week	IPM Practices plot					Growers practices plot				
	Population of sucking pests per leaf			Bollworm damage %	Natural enemies 000/acre	Population of sucking pests per leaf			Bollworm damage %	Natural enemies 000/acre
	Thrip	Jassid	W. fly			Thrip	Jassid	W. fly		
					July					
1st wk	1.90	0.60	0.80	0.00	3	3.2	0.60	0.60	0.00	2
2nd wk	10.60	1.40	0.40	0.00	30	16.8	1.00	3.40	0.00	13
					August					
1st wk	2.80	0.50	0.24	0.00	19	3.46	0.40	0.26	0.00	13
2nd wk	3.30	1.17	0.26	0.00	11	4.23	2.18	0.20	1.50	5
3rd wk	7.33	0.60	0.46	0.80	27	12.06	1.46	0.53	15.50	23
4th wk	1.40	0.20	0.10	7.46	19	0.60	0.20	0.10	4.68	5
					September					
1st wk	1.22	0.42	0.40	2.6	37	1.86	0.30	0.31	6.80	26
2nd wk	1.23	0.10	0.26	12.5	31	1.23	0.58	0.60	8.00	17
3rd wk	0.65	0.20	0.23	5.78	33	0.71	0.76	0.58	7.44	14
4th wk	0.46	0.08	0.72	1.73	22	1.46	0.21	1.02	7.20	9

Table 2. Details of the expenditure incurred on IPM versus growers approaches.

Details of items	Expenditure of IPM plot (Rs.)	Expenditure of growers plot (Rs.)	Difference (Rs.) expenditure More than IPM plot
Land bed preparation	1000	1000	Nil
Seed	250	300	50
Drilling	200	200	Nil
Weeding/inter-culturing	200	200	Nil
Chemical fertilizer			
DAP 1 bag	880	895	15
Urea 1 bag	425	455	30
			Because they took on credit
Pesticides	(No spray)	250 (one spray)	250
Irrigation (Tube well)	400 (Four times)	400 (Four times)	Nil
Picking charges	1500	1200	-300
Total Expenditure	4855	4900	45
Cost benefit analysis			
Seed cotton yield	15.00 Maunds/acre @ 1220/maund Rs. 18300/acre	12.00 Maunds/acre @ 1220/maund Rs. 14640/acre	Rs.3705 (38.03% Profit increase over growers plot)
	Net profit Rs. 13445	**Net profit Rs. 9740**	

The IPM approach has many more long-term advantages/benefits than only relying on chemical control method. Which do not only enhance the cost of production but the indiscriminate use of pesticides creates many other problems like, degradation of environment, enhancement in pollution, resistance to pesticides, out break of secondary pests etc. It is therefore proposed that, the IPM approach may be advocated in the growers community by providing training and on farm demonstration to motivate them towards the adaptation of the IPM approach. During the course of weekly studies, some 30 growers of the area have regularly visited both the trials and obtained the training for the identification of pests, their natural enemies, pest scouting etc, it enhanced their capabilities/skill in decision making process and enabled them to depend on their own rather than any one else to decide for their crop.

Conclusion

The experience of Farmer Field School shows that the best way for the transfer of technology in practice is through training of farmers about IPM. At a FFS Farmers learn to carryout experiments, identify insect pests and makes recommendations based on Cotton Eco System Analysis (CESA). Cotton field is the laboratory where most activities take place. Sustainable agriculture involves the successful management of resources and this can be achieved through the development, promotion and practice of IPM by farmers. According the pre/post test comparison of the member farmers of FFS, results showed 65% improvement regarding pesticides hazards, 50% improvement about selection of good quality seed, 65% improvement in identification of insect pests of cotton, 50% improvement about identification of natural enemies and about cotton contamination 75% improvements observed. IPM plot provided (25%) more yield and (38.03%) profit increase over growers plot.

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