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Knowledge of recommended integrated pest management technology by cotton growers

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Abstract

The study entitled, "Knowledge of Recommended Integrated Pest Management Technology by Cotton Growers" was purposively conducted in Nagpur district of Maharashtra state. Exploratory research design was used for the study. A purposive sample of 120 farmers from villages in Narkhed and Katol tahsils from Nagpur district was drawn and the data was collected with the help of structured interview schedule. The findings indicated that, majority of the respondents 57.50 percent were in middle age group of 36 to 50 years, 34.16 percent of the respondents were educated up to secondary school, 39.16 percent of the respondents belonged to category of small land holding ranging from 1 to 2.00 ha., 34.17 percent of the respondents had annual income up to Rs. 2,00,001 to Rs. 4,00,000, 74.17 percent of the respondents come under 1.07 to 4.57 area under cotton cultivation, majority of the respondents 62.50 percent were having medium social participation, majority of the respondents 72.50 percent were having medium level of sources of information, 79.17 percent of the respondents were observed under medium level of economic motivation, 60.83 percent of the respondents had medium level of risk orientation and 67.50 percent of the respondents had medium level of scientific orientation about cotton recommended cultivation practices.

It was observed that, majority 59.16 percent of the respondents were medium category knowledge of recommended cotton cultivation practices, followed by 30.00 percent of respondents were observed in high level of knowledge.

Keywords: Knowledge, integrated, pest, cotton

Introduction

Cotton popularly known as 'White Gold' is the main kharif crop and important commercial crop widely grown in the country. It provides raw material for the textile industry. It accounts for more than 80 percent of all the textile fiber consumed by the Indian textile mills. Besides fibers, cotton seed has economic importance and plays a vital role in the economics of 2 agricultural and industrial development. Historical references indicate that the earliest civilization to spin and weave cotton will be in India. For over three thousand years (1500BC to 1700AD), India will be recognized as the cradle of cotton industry. The main objective of IPM is to promote and support safe, effective and environmentally sound pest management. Nearly 130 species of insect pests occur on Indian cotton with a dozen of these arthropods requiring their management for realizing better cotton yields. Sucking pests *viz*. jassids, aphids, whiteflies & thrips are deleterious to the process of cotton growth and development with their ability to build up to serious proportions as a result of rapid and prolific breeding in cotton plant. While direct effects of sucking pest during early season are visualized in terms of poor crop stand and yield reduction, their late season attack (especially aphids and whiteflies) indirectly decreases cotton fiber quality due to deposits of honey dew on lint. The reproductive phase of cotton crop growth suffers damage inflicted by bollworm complex consisting three genera of bollworms *viz*. spotted boll worm, American bollworm & pink bollworm. IPM is an essential component for a sustainable cotton production system having two essential elements. First comprises a series of measures which help in keeping insect pests below economic threshold levels (ETL). Such control methods include natural control agents, host plant resistance, manipulation of agronomic factors such as rotation, spacing, time of sowing and fertilizer applications beside biological control and use of botanicals.

Cotton is a major commercially grown crop of the Vidarbha region and keeping in view the importance of IPM to manage the insects and pests of cotton crop, the present study will be framed as knowledge of recommended Integrated Pest Management technology by cotton growers.

Methodology

The present study was carried out in Nagpur district of Vidarbha region in Maharashtra State. An exploratory research design of social research was used for the study.

Out of fourteen tahsils of Nagpur district five tahsils *viz*. Ramtek, Saoner, Kalmeshwar, Narkhed and Katol are major cotton growing tahsils. On the basis list obtained from the Agricultural Department of SAO and SDO office. Out of above five tahsils *viz*. Narkhed and Katol were selected purposively. In this present study from each selected tahsils *viz*. Narkhed and Katol tahsil, six villages were selected by using simple random sampling method. Thus, twelve villages were selected from two tahsils. The list of cotton growers was obtained from concern village panchayat and from there list of ten cotton growers were selected by using simple random sampling method. Thus, from ten selected villages 120 cotton growers were selected and they were considered as respondents in the present study. For collection in data interview structured schedule was prepared by following logical steps. Data were collected by personal interview of respondents. Their responses were considered for the purpose of the study. To study the knowledge of recommended Integrated Pest Management technology by cotton growers was tested against the practices finalized for the study. knowledge test was developed for the study and responses of selected farmers were noted on three point continuum i.e. full knowledge, partial knowledge, no knowledge. After administration of dependent variables index was developed for knowledge.

Results and Discussion

Profile of the growers

Table 1: Distribution of growers according to their personal, socio-economical, communicational and psychological characteristics

Sr. No	Category	Frequency	Percent
(I) Personal characteristics			
1	**Age**		
	Young age (Up to 35 years)	19	15.83
	Middle age (36 to 50 years)	69	57.50
	Old age (Above 50 years)	32	26.67
2	**Education**		
	Illiterate (No. schooling)	03	02.50
	Primary school (1-4 Standards)	13	10.83
	Middle school (5-7 Standards)	19	15.83
	Secondary school (8-10 Standards)	41	34.17
	Higher secondary school (11-12 Standards)	27	22.50
	College (Above 12 Standard)	17	14.17
3	**Land holding**		
	Semi medium (2.01 to 4 ha)	07	05.83
	Small (1.01 to 2 ha)	47	39.17
	Marginal (0.01 to 1 ha)	42	35.00
	Medium (4.01 to 10 ha)	24	20.00
	Big (Above 10 ha)	00	00.00
4	**Family income**		
	Up to - 2,00,000	25	20.83
	Rs.2,00,001 to 4,00,000	41	34.18
	Rs 4,00,001 to 6,00,000	28	23.33
	Rs 6,00,001 to 8,00,000	16	13.33
	Above Rs. 8,00,0000	10	08.33
5	**Area under cotton**		
	Low (up to 1.06)	17	14.16
	Medium (1.07 to 4.57)	89	74.17
	High (above 4.75)	14	11.67
B. Communication variables			
6	**Social participation**		
	Low social participation (Up to 8 score)	23	19.50
	Medium social participation (9 to 14 score)	75	62.50
	High social participation (Above 14 score)	22	18.00
7	**Sources of information**		
	Low sources of information (Up to 12 score)	15	12.50
	Medium sources of information (13 to 17 score)	87	72.50
	High sources of information (Above 17 score)	18	15.00
C. Psychological variables			
8	**Economic motivation**		
	Low economic motivation (Up to 10 score)	14	11.66
	Medium economic motivation (10 to 17 score)	95	79.17
	High economic motivation (Above 17 score)	11	09.17
11	**Risk orientation**		
	Low risk orientation (Up to 15 score)	22	18.34
	Medium risk orientation (15 to 22 score)	73	60.83
	High risk orientation (Above 22 score)	25	20.84
12	**Scientific orientation**		
	Low innovativeness (Up to 16 score)	20	16.67
	Medium innovativeness (17 to 22 score)	81	67.50
	High innovativeness (Above 22 score)	19	15.83

The result demonstrated in the table no 1. revealed that exactly 57.50 percent of growers belongs to middle age group, 34.17 percent belongs to secondary school level education, 39.17 percent of the growers had small land holding, 34.18 percent of the growers had Rs. 2,00,001 to 4,00,000 family income, 74.17 percent of the cotton growers had medium level of area under cotton cultivation, 62.50 percent of the cotton growers had medium level of social participation, 72.50 percent of the cotton growers had medium level of sources of information, 79.17 percent of the cotton growers had medium level of economic motivation, 60.83 percent of the cotton growers had medium level of risk orientation and 67.50 percent of the cotton growers had medium level of scientific orientation.

Above findings were in conformity with the findings of Chavan (2014) [2], Chouhan *et al.* (2013) [3], Kadu (2016) [4], Masudkar *et al.* (2017) [5], Rao (2016) [6], Roy (2017) [8].

Knowledge of the growers about recommended integrated pest management technology

Table 2: Distribution of the respondents according to practice wise knowledge about recommended integrated pest management technology in cotton

Sl. No.	Particulars	Recommendation	FK	PK	NK
A	**Cultural Control**				
1	Grazing animals (Sheep, Goat etc.)	End Dec. to Jan.	101 (84.17)	16 (13.33)	3 (02.50)
2	Ploughing	Two	113 (94.17)	7 (5.83)	0 (00.00)
3	Burning of plant debris & Cleaning Campaign	Yes/No	100 (83.33)	16 (13.34)	4 (03.33)
4	Sowing time	Second week of June to First week of July	93 (77.50)	22 (18.33)	5 (04.17)
5	Resistant variety	e.g. PKV 5, PKV Suvarna.	7 (05.83)	100 (83.34)	13 (10.83)
6	Seed rate	2.00 to 2.50 kg/ha	57 (47.50)	47 (39.17)	16 (13.33)
7	FYM	50 quintals /ha	42 (35.00)	63 (52.50)	15 (12.50)
8	**Fertilizers**				
	N	60 kg/ha	23 (19.17)	75 (62.50)	22 (18.33)
	P	30 kg/ha	14 (11.67)	80 (66.66)	26 (21.67)
	K	30 kg/ha	11 (9.17)	75 (62.50)	34 (28.33)
9	Crop Rotation	Cotton–Soybean Gram	44 (36.66)	65 (54.17)	11 (9.17)
		Cotton – Mung Safflower	42 (35.00)	56 (46.66)	22 (18.34)
		Cotton – Udid Safflower	36 (30.00)	62 (51.66)	22 (18.34)
		Cotton – Jowar – Gram	45 (37.50)	10 (08.33)	65 (54.17)
10	Inter cropping	Cotton + Mung /Udid (1:1)	8 (06.67)	55 (45.83)	57 (47.50)
		Cotton + Jowar + tur + Jowar (3:1:1:1)	15 (12.50)	55 (45.83)	50 (41.67)
		Cotton + Tur (8 to 10:1)	68 (56.67)	52 (43.33)	00 (00.00)
B	**Mechanical control**				
1	Use of Proper Spacing between plant	90 x 45	30 (25.00)	71 (59.17)	19 (15.83)
		60 x 45	81 (67.50)	27 (22.50)	12 (10.00)
		60 x 30	95 (79.16)	25 (20.84)	00 (00.00)
2	Removal of rosette flower and removal of infested plant parts	Remove and destroy the pest affected plant/plant parts at the beginning when the infestation is very high.	74 (61.67)	37 (30.83)	9 (7.50)
3	Use Pheromone trap/Light trap/Yellow Sticky trap	P.T.: 4 per ha	15 (12.50)	62 (51.67)	43 (35.83)
		Y.S.T.: 25 per ha.	20 (16.66)	25 (20.84)	75 (62.50)
		L.T.: 1 per ha.	35 (29.16)	15 (12.50)	70 (58.34)
4	Installation of Bird perches	10-12 per ha	88 (73.33)	26 (21.67)	5 (4.17)
C	**Biological control**				
1	Use of Biological Spray	Spray of NSE 5 percent or Azadirachtin formulation	26 (21.67)	88 (73.33)	6 (05.00)
2	Use of Trichogramma Card	40-50 DAS	07 (05.83)	68 (56.67)	45 (37.50)
D	**Chemical control**				
1	Use of Pesticide	e.g.: Ethion, Quinalphos, Fipronil, Chlorpyrifos, Acephate etc.	44 (36.67)	70 (58.33)	6 (05.00)
		Combination of			
		Insecticide			

(Figure in parenthesis indicate percentage)

Notation: FK – Full knowledge, PK – Partial knowledge, NK – No Knowledge

It was observed from Table 2 that majority of respondents had full knowledge regarding selected cultural practices of IPM in cotton cultivation included ploughing (94.17%), grazing animal (84.17%), burning of plant debris and cleaning campaign (83.33%), sowing time (77.50%), and intercropping (cotton + tur) (56.67%), respectively. The respondents also had full knowledge about seed rate (47.50), FYM (42.00%), crop rotation (cotton-soybean-gram) (36.66%), (cotton-jowar-gram) (37.50%), use of pesticide (36.67%), Cotton – Mung – Safflower (35.00%) and Cotton – Udid – Safflower (30.00%), Remove and destroy the pest affected plant/plant parts at the beginning when the infestation is very high (30.83%), use of biological spray (21.67%), use of proper spacing (15.83%), use of yellow sticky trap (16.66%), use pheromone trap (12.50%), use of light trap (29.16%), use of Trichogramma card and resistant

variety both (05.83), and fertilizers N (19.17%), P (11.67%), K (09.17%) respectively.

The Table 2 revealed that respondents had partial knowledge regarding selected cultural practices of IPM in cotton cultivation included resistant variety (83.34), use of biological spray (73.33%), phosphorus (66.66%), potash (62.50%), nitrogen (62.50%), use of proper spacing (59.17%), Cotton + Jowar + tur + Jowar (3:1:1:1) (45.83%), Cotton – Soybean – Gram (54.17%), Cotton + Tur (8 to 10:1) (43.33%), Cotton – Mung – Safflower (41.66%) and Cotton – Udid – Safflower (51.66%), seed rate (39.17%), removal of rosette flower and removal of infested plant parts (61.67%), Installation of bird perches (21.67%), grazing animals and burning of plant debris & cleaning campaign (13.34%), Cotton – Jowar – Gram (8.33%), ploughing (05.83%).

The Table 2 revealed that respondents had no knowledge regarding selected cultural practices of IPM in cotton cultivation included Installation of bird perches (04.17%), Cotton – Jowar – Gram (54.17%), cotton + mung/udid (47.50%), Cotton + Jowar + tur + Jowar (41.67%), use of Trichogramma card (37.50%), Cotton – Soybean – Gram (36.66%), Use Pheromone trap (35.83%), Light trap (58.34%), Yellow Sticky trap (62.50%), use of proper spacing (25.00%), potash (28.33%), phosphorus (21.67%), crop rotation of crop Cotton – Mung – Safflower (18.34%) and Cotton – Udid – Safflower (18.34%), nitrogen (18.33%), use of biological spray and Use of Pesticide (05.00%), seed rate (13.33%), FYM (12.50%), resistant variety (10.83%), removal of rosette flower and removal of infested plant parts (07.50%), sowing time (04.17%), burning of plant debris & cleaning campaign (03.33%) and grazing animals (02.50%).

Overall conclusion here is that the respondents possess full knowledge about ploughing, grazing animal, burning of plant debris and cleaning campaign, sowing time, intercropping (cotton+tur). Whereas the respondents had partial knowledge about technologies like resistant variety, use of biological spray, phosphorus, potash, nitrogen, use of proper spacing. Whereas the majority respondents possess no knowledge about pheromone trap, yellow sticky trap, light trap, Cotton – Jowar – Gram, cotton + mung/udid, Cotton + Jowar + tur + Jowar, use of Trichogramma card.

Table 3: Distribution of cotton growers according to their level of Knowledge

Sr. No.	Category	Respondents (n = 120)	
		Frequency	Percentage
1	Low (up to 33.33)	13	10.84
2	Medium (33.34 to 66.66)	71	59.16
3	High (Above 66.66)	36	30.00

It is revealed from Table 3 that 59.16 percent of the respondents had possessed medium level of knowledge followed by 30.00 percent of the respondents had possessed high level of knowledge and 10.84 percent of the respondents had possessed low level of knowledge about recommended integrated pest management technology of cotton.

From the above table 3 we can conclude that majority of the respondents having the medium level of knowledge.

This finding is similar to that finding of Shinde (2019) [9], Rathwa *et al.* (2021) [7], Ambhure and Syed (2022) [1].

Conclusion

Cotton is important cash crop in India. However, main losses in cotton production are due to susceptibility to insect pests and contribute to lower yield. So, Integrated Pest Management is important practices for the increasing the cotton crop production and productivity purpose. The study shows that majority of respondents were in middle to old age group, secondary to higher secondary school level of education, small to semi-medium land holding, majority of the respondents had medium level to high area under cotton, 2,00,001 to 4,00,000 of family income, low to medium level social participation, medium to high sources of information, low to medium level of economic motivation, medium to high level of risk orientation, low to medium level of scientific orientation. Above table no 3 revealed that the majority of the grower had medium to high level of knowledge regarding integrated pest management.

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