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Profile and knowledge of cotton growers about pheromone trap

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Abstract

The present study entitled “Profile and Knowledge of Cotton Growers about Pheromone Trap” was undertaken to study the profile of cotton growers and their knowledge regarding pheromone traps. The study was conducted purposively in Buldhana district of Vidarbha region of Maharashtra, covering Shegaon and Sangrampur tahsils and fourteen villages. A total of 140 cotton growers were selected, comprising 70 adopters and 70 non-adopters of pheromone traps. Primary data were collected through personal interviews using a pre-tested, structured interview schedule. The profile of respondents was studied in terms of selected personal, socio-economic and communication characteristics. Knowledge was assessed through twenty statements covering meaning, components, installation, maintenance, operation and utility of pheromone traps. The findings revealed that the majority of adopters (61.43%) and non-adopters (67.14%) belonged to the middle age group of 36 to 50 years. Most respondents had higher secondary education, semi-medium land holdings and agriculture as their main occupation. A majority possessed high farming experience of above 20 years. Further, 70.00 per cent of adopters and 55.71 per cent of non-adopters had annual income above ₹4,00,000. Regarding knowledge all adopters (100.00%) knew the basic meaning of pheromone traps, while 85.71 per cent knew their main advantage. However, knowledge regarding lure types, trap types and lure replacement was comparatively low. Overall, 51.43 per cent of adopters had medium knowledge, whereas 71.43 per cent of non-adopters had low knowledge. The study emphasized the need for extension education, training and demonstrations to improve technical knowledge and promote effective use of pheromone traps among cotton growers.

Keywords: Cotton growers, pheromone trap, knowledge, adopters, non-adopters, pest management

1. Introduction

Cotton is an important commercial crop that provides livelihood and income to a large number of farming households, but its production is frequently constrained by heavy insect pest pressure. The term pheromone was first coined by Karlson and Lüscher (1959) ^[17] following the identification of bombykol, the sex pheromone of the silkworm moth, and hundreds of insect pheromones have since been identified and characterised (Cardé & Minks, 1997) ^[5]. Sex pheromones, chemical signals released by insects to influence mate-finding behaviour, have been increasingly exploited in pest management because of their species-specificity, biodegradability and effectiveness at very low concentrations. Pheromone traps, which combine a species-specific lure with a suitable trap structure, are used for monitoring pest occurrence, mass trapping and mating disruption (Shorey & McKelvey, 1977) ^[22], and can help farmers time their insecticide applications more rationally. Cotton is an important commercial crop that provides livelihood and income to a large number of farming households, but its production is frequently constrained by heavy insect pest pressure. The term pheromone was first

coined by Karlson and Lüscher (1959) ^[17] following the identification of bombykol, the sex pheromone of the silkworm moth, and hundreds of insect pheromones have since been identified and characterised (Cardé & Minks, 1997) ^[5]. Sex pheromones, chemical signals released by insects to influence mate-finding behaviour, have been increasingly exploited in pest management because of their species-specificity, biodegradability and effectiveness at very low concentrations. Pheromone traps, which combine a species-specific lure with a suitable trap structure, are used for monitoring pest occurrence, mass trapping and mating disruption (Shorey & McKelvey, 1977) ^[22], and can help farmers time their insecticide applications more rationally.

2. Methodology

The study was purposively conducted in Buldhana district of the Vidarbha region of Maharashtra, an important cotton-growing district. Shegaon and Sangrampur tahsils were purposively selected on the basis of the area under cotton cultivation, and fourteen villages (seven from each tahsil) with a considerable concentration of cotton growers were further selected. From each village, ten cotton growers were

chosen, five of whom had adopted pheromone traps and five of whom had not, giving a total sample of 140 respondents comprising 70 adopters and 70 non-adopters.

Primary data were collected through personal interviews using a pre-tested, structured interview schedule covering the personal, socio-economic and communication characteristics of the respondents, along with their knowledge of pheromone trap. Knowledge was assessed using twenty statements covering the meaning, components, installation, maintenance, operation and utility of pheromone traps in cotton, on a two-point continuum (Yes/No), with a score of 1 assigned for a correct response and 0 for an incorrect response. The knowledge score of each respondent was

converted into a knowledge index using the formula:

$$\text{Knowledge Index} = \frac{\text{Actual knowledge score obtained}}{\text{Maximum obtainable knowledge score}} \times 100$$

Based on the index, respondents were categorised as having low (up to 33.33%), medium (33.34 to 66.66%) or high (above 66.66%) knowledge. Data were analysed using frequency and percentage

3. Results and Discussion

3.1 Profile of cotton growers

Table 1: Distribution of adopter and non-adopter cotton growers according to selected profile characteristics

Characteristic	Adopters (n=70)		Non-adopters (n=70)	
	F	%	F	%
Age (years)				
Young (up to 35)	15	21.43	09	12.86
Middle (36 to 50)	43	61.43	47	67.14
Old (above 50)	12	17.14	14	20.00
Total	70	100.00	70	100.00
Education				
Illiterate	01	1.43	03	4.29
Primary school	03	4.29	10	14.29
Middle school	11	15.71	09	12.86
Secondary school	18	25.71	14	20.00
Higher secondary	25	35.71	23	32.86
College	12	17.14	11	15.71
Total	70	100.00	70	100.00
Land holding (ha)				
Marginal (up to 1.00)	13	18.57	10	14.29
Small (1.01 to 2.00)	05	7.14	09	12.86
Semi-medium (2.01 to 4.00)	34	48.57	40	57.14
Large (above 4.00)	18	25.71	11	15.71
Total	70	100.00	70	100.00
Occupation				
Agriculture + labour	14	20.00	19	27.14
Agriculture (Farming) alone	46	65.71	39	55.71
Agriculture + allied occupation	07	10.00	10	14.29
Agriculture + business	02	2.86	01	1.43
Agriculture + service	01	1.43	01	1.43
Total	70	100.00	70	100.00
Farming experience (years)				
Low (up to 10)	02	2.86	02	2.86
Medium (11 to 20)	27	38.57	29	41.43
High (above 20)	41	58.57	39	55.71
Total	70	100.00	70	100.00
Area under cotton (ha)				
Marginal (up to 1)	13	18.57	10	14.29
Small (1.01 to 2)	28	40.00	35	50.00
Semi-medium (above 2)	29	41.43	25	35.71
Total	70	100.00	70	100.00
Annual income (Rs.)				
Up to 2,00,000	09	12.86	08	11.43
2,00,001 to 4,00,000	12	17.14	23	32.86
Above 4,00,000	49	70.00	39	55.71
Total	70	100.00	70	100.00
Frequency of extension contact				
Up to 2 sources	34	48.57	34	48.57
3 to 4 sources	28	40.00	33	47.14
Above 4 sources	08	11.43	03	4.29
Total	70	100.00	70	100.00

The data in Table 1 revealed that the majority of both adopter (61.43%) and non-adopter (67.14%) cotton growers belonged to the middle age group of 36 to 50 years, a pattern consistent with the findings of Kale *et al.* (2015) ^[15], Borhude (2016) ^[4], Ahire *et al.* (2018) ^[1] and Jakkawad *et al.* (2019) ^[13]. With respect to education, the largest proportion of both adopters (35.71%) and non-adopters (32.86%) had studied up to the higher secondary level, broadly in line with the education levels reported among cotton growers by Kale *et al.* (2015) ^[15] and Ahire *et al.* (2018) ^[1]. Semi-medium land holdings of 2 to 4 ha were most common among both adopters (48.57%) and non-adopters (57.14%), similar to the semi-medium land-holding pattern reported by Roy (2017) ^[21]. Agriculture alone was the principal occupation of the majority of adopters (65.71%) and non-adopters (55.71%), corroborating Gamanagatti and Dodamani (2016) ^[9], who likewise found

agriculture to be the primary occupation of most cotton growers, and the majority of both groups possessed high farming experience of above 20 years. A comparatively higher proportion of adopters (70.00%) than non-adopters (55.71%) had annual income above Rs. 4,00,000, and adopters also reported somewhat wider extension contact, consistent with Ahire *et al.* (2018) ^[1] and Jakkawad *et al.* (2019) ^[13], who linked higher income and extension contact to greater adoption of recommended IPM practices. Overall, the two groups were broadly similar with respect to age, education, occupation and farming experience, but adopters held a slight edge in land holding, income and extension contact.

3.2 Knowledge of cotton growers about pheromone trap

Table 2: Practice-wise knowledge of adopter and non-adopter cotton growers about pheromone trap.

Sr. No.	Statements	Adopters (n=70)		Non-adopters (n=70)	
		(Yes)	(No)	(Yes)	(No)
1	What is pheromone trap	70 (100.00)	00 (00.00)	62 (88.57)	08 (11.43)
2	What is the main advantage of pheromone trap	60 (85.71)	10 (14.29)	56 (80.00)	14 (20.00)
3	What are the types of pheromone traps	11 (15.71)	59 (84.29)	00 (0.00)	70 (100.00)
4	Which type of pheromone trap is used in cotton field	40 (57.14)	30 (42.86)	31 (44.29)	39 (55.71)
5	What is a lure in a pheromone trap	53 (75.71)	17 (24.29)	00 (0.00)	70 (100.00)
6	What is the purpose of a lure in pheromone traps	43 (61.43)	27 (38.57)	00 (0.00)	70 (100.00)
7	Which type of lure is used in cotton pheromone traps	09 (12.86)	61 (87.14)	00 (0.00)	70 (100.00)
8	Where is the lure placed in the pheromone trap	48 (68.57)	22 (31.43)	05 (7.14)	65 (92.86)
9	Which insects are attracted by pheromone traps	45 (64.29)	25 (35.71)	05 (7.14)	65 (92.86)
10	For which major pests of cotton are pheromone traps available	55 (78.57)	15 (21.43)	43 (61.43)	27 (38.57)
11	How many pheromone traps should be installed per hectare	47 (67.14)	23 (32.86)	13 (18.57)	57 (81.43)
12	When should pheromone traps be installed in the field	48 (68.57)	22 (31.43)	18 (25.71)	52 (74.29)
13	What is the spacing between pheromone traps in a crop field	38 (54.29)	32 (45.71)	00 (0.00)	70 (100.00)
14	What is the placement height of traps in the cotton field	45 (64.29)	25 (35.71)	09 (12.86)	61 (87.14)
15	In how many days should the lure be replaced periodically	21 (30.00)	49 (70.00)	00 (0.00)	70 (100.00)
16	What is the purpose of checking the pheromone trap regularly	52 (74.29)	18 (25.71)	07 (10.00)	63 (90.00)
17	How should the captured moths in a pheromone trap be destroyed	32 (45.71)	38 (54.29)	18 (25.71)	52 (74.29)
18	What is the cost for installing pheromone traps per ha	29 (41.43)	41 (58.57)	14 (20.00)	56 (80.00)
19	What are the sources of lure availability	39 (55.71)	31 (44.29)	22 (31.43)	48 (68.57)
20	Pheromone traps are safe for the insects.	50 (71.43)	20 (28.57)	17 (24.29)	53 (75.71)

Table 3: Distribution of adopter and non-adopter cotton growers according to overall level of knowledge about pheromone trap

Sl. No.	Knowledge level	Adopters (n=70)		Non-adopters (n=70)	
		F	%	F	%
1	Low (up to 33.33%)	11	15.71	50	71.43
2	Medium (33.34 to 66.66%)	36	51.43	20	28.57
3	High (above 66.66%)	23	32.86	00	0.00
	Total	70	100.00	70	100.00

All adopter cotton growers (100.00%) correctly knew the basic meaning of a pheromone trap, followed by knowledge of its main advantage (85.71%), major cotton pests for which traps are available (78.57%) and the purpose of regularly checking the trap (74.29%). Knowledge was comparatively lower among adopters for lure type (12.86%), types of traps (15.71%) and lure-replacement periodicity (30.00%). Among non-adopters, knowledge was largely confined to the general meaning (88.57%) and main advantage (80.00%), while knowledge of nearly all technical aspects was negligible or absent, a pattern similar to that reported by Ahire *et al.* (2018) ^[1] and Jakkawad *et al.* (2019) ^[13], who also found general

awareness of IPM technologies to be considerably higher than technical knowledge among cotton growers.

The majority of adopter cotton growers (51.43%) had medium knowledge, followed by high (32.86%) and low (15.71%). In contrast, the majority of non-adopters (71.43%) had low knowledge, followed by medium (28.57%), while none had high knowledge — consistent with earlier findings of Borhude (2016) ^[4] and Kapse *et al.* (2018) ^[16] on medium-level knowledge predominating among cotton growers.

4. Conclusion

Cotton growers in the study area were predominantly middle-aged, educated up to higher secondary level, holders of semi-medium land, primarily dependent on agriculture, and experienced farmers, with adopters of pheromone traps showing a marginal advantage in land holding, income and extension contact over non-adopters. While general awareness of pheromone traps was fairly widespread, in-depth technical knowledge relating to lures, trap spacing, installation timing and maintenance was limited, particularly among non-adopters, more than two-thirds of whom fell in the low knowledge category. Strengthening farmers'

technical knowledge through focused extension education is essential for wider and more effective adoption of pheromone trap in cotton.

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