

## RESEARCH ARTICLE

# Adoption gap in integrated pest management technology of cotton

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## ABSTRACT

The study was undertaken in Parbhani district of Marathwada region in Maharashtra state, as in this district, MKV has implemented ICAR sponsored project on integrated pest management during the year 2010- 11 in ten villages of three talukas. The study of adoption gap was made in terms of personal characteristics of cotton growers. Involvement of cotton growers in performing social participation. In the present study, majority of respondents were observed in farm experience of 9-31 years, having education upto secondary school level. Majority of them were having medium family size. Most of the them were having small landholding and their family income was from Rs. 57,326/- to Rs. 2,82, 190/-. In this present study, it was observed that majority of the respondents had medium level of adoption gap.

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## INTRODUCTION

Cotton, being a cash crop, is of great economic importance for the Indian farming community. Nevertheless, it is highly prone to a number of insect pests and diseases. A good crop with minimum pest attack brings prosperity, while a severe pest attack brings misery. Pests also became resistant to chemical pesticides and cause significant increase crop losses. Pesticides do not provide lasting control and so needed repeated applications. Continued use of pesticides builds up high level of toxic residues in food, ground water and air. Several important cash crops are now tested for pesticide residues before being accepted as import items by various countries. This is more so in the rainfed areas where opportunities for growing alternative crops are limited due to marginality of the production environment. Thus, pest is an important determinant of the prosperity of the rainfed farmers. Excess use of insecticides also increases cost of cultivation. This knowledge has led to a shift towards eco-friendly technologies in pest management. Integrated pest management therefore, has emerged as a solution to avoid excessive use of insecticides. Integrated pest management is

the integrated use of pest control strategies in a way that not only reduces pest population to satisfactory level but is sustainable and non-polluting. It is therefore necessary to see the contents of use of integrated pest management by cotton growers. The pest problem though cannot be eliminated altogether, it can be minimized through application of appropriate pest management strategy, be it chemical pest control, biological control or integrated pest management (IPM). The chemical-based pest management, however, has been losing its efficiency mainly due to rising problem of insecticide resistance. An IPM package comprised of cultural practices, resistant varieties, insect scouting, beneficial insects and the selective use of insecticides was developed and tested under field conditions. The effectiveness of IPM gets maximized when all growers use them on a community basis over area-wide. The goal of IPM does not aim for reduction of the insect population to zero but merely to a level below the economic damage. IPM strategies focus on an appropriate mixture of eco-friendly practices. It includes eco-friendly practices which are grouped as cultural, mechanical, biological and chemical. Adoption gap means operationalized as the gap between recommended IPM practices and actual adoption of

IPM practices by the cotton growers. Low adoption gap means maximum adoption, and similarly high adoption gap means minimum adoption of IPM practices.

## MATERIALS AND METHODS

For the study, Parbhani district was selected purposively because it has implemented IPM Project of ICAR through Marathwada Krishi Vidyapeeth. Eight villages were selected purposively as it has IPM followers in cotton crop of Parbhani district. From the each selected taluka, four villages were selected purposively *viz.*, in Manwat taluka Kolhawadi, Irlad, Ambegaon and Rudhi and in Selu taluka Nipani Takli, Digras, Rajewadi and Kawaddhan. From each of the villages fifteen numbers of the respondents were selected. Thus, 120 respondents were selected for study. Ex. post facto study method was used for research study. The data were collected with the help of structured schedule. The respondents were contacted personally at their home or at their farms as per their convenience. Keeping in view the objectives of the study an interview schedule was prepared.

## RESULTS AND DISCUSSION

The experimental findings of the present study have been presented in the following sub heads:

### Personal, socio-economic and psychological characteristics of cotton growers :

It was worthy to note from Table 1 that about 67.51 per cent of respondents were having medium farming experience (9 to 31 years of farm experience). There were 14.16 per cent of the respondents who were having low farming experience (up to 8 years of farm experience). As much as 18.33 per cent of the respondents were having high farming experience (32 years and above farm experience). Majority of respondents 55.01 per cent of the respondents were educated up to secondary school level (5<sup>th</sup> to 10<sup>th</sup> std.), while 18.33 per cent respondents were illiterate and 14.16 per cent of the respondents were educated up to primary level (1<sup>st</sup> to 4<sup>th</sup> std.), 7.50 per cent of respondents were educated up to college level (above 12<sup>th</sup>), 5.00 per cent of the respondents were educated up to higher secondary school level (11<sup>th</sup> and 12<sup>th</sup> std.). As regards land holding of the respondents, it was observed from Table 1 that 35.01 per cent of respondents were small farmers (1.1 to 2 ha) followed by 34.16 per cent of respondents were semi-medium farmers (2.1 to 4 ha), 17.51 per cent of the respondents were medium farmers (4.1 to 10 ha), 9.16 per cent and 4.16 per cent of them were marginal farmers (up to 1 ha) and big farmers were having 10.1 ha and above ha. land, respectively. It is revealed from Table 1 that about 79.16 per cent of respondents were having medium size of family (3 to 8 members). There were 10.83 per cent of the respondents having small size of

**Table 1 : Distribution of respondents according to their personal, socio-economic and psychological characteristics (n=120)**

Sr. No.	Category	No.	Per cent
A	<b>Farm experience</b>		
	Low (up to 8 years)	17	14.16
	Medium (9 to 31 years)	81	67.51
	High (32 years and above)	22	18.33
B	<b>Education</b>		
	Illiterate	22	18.33
	Primary (1 <sup>st</sup> Std. to 4 <sup>th</sup> Std.)	17	14.16
	Secondary (5 <sup>th</sup> Std. to 10 <sup>th</sup> Std.)	66	55.01
	Higher Secondary (11 <sup>th</sup> and 12 <sup>th</sup> Std.)	06	05.00
	College education (above 12 <sup>th</sup> )	09	07.50
C	<b>Size of land holding</b>		
	Marginal farmers (up to 1 ha)	11	09.16
	Small farmers (1.01 to 2ha)	42	35.01
	Semi-medium farmers (2.01 to 4 ha)	41	34.16
	Medium farmers (4.01 to 10 ha)	21	17.51
	Big farmers(10.01ha and above)	05	04.16
D	<b>Size of family</b>		
	Low ( up to 2 )	13	10.83
	Medium ( 3 to 8 )	95	79.16
	High ( 9 and above )	12	10.01
E	<b>Annual income</b>		
	Low (below ` 57325)	10	08.33
	Medium ( ` 57326 to ` 282190)	92	76.66
	High ( ` 282191 and above)	18	15.01
F	<b>Social participation</b>		
	Low (up to 0.16)	75	62.51
	Medium (0.17 to 1.03)	38	31.66
	High (1.04 and above)	07	05.83
G	<b>Economic motivation</b>		
	Low ( Up to 20 )	12	10.00
	Medium ( 21 to 23)	87	72.50
	High ( 24 and above)	21	17.50
H	<b>Cosmopolitaness</b>		
	Low ( up to 4)	13	10.83
	Medium ( 5 to 11)	96	80.01
	High ( 12 and above)	11	9.16
I	<b>Knowledge level</b>		
	Low ( up to 14)	27	22.50
	Medium ( 15 to 24)	75	62.50
	High ( 25 and above)	18	15.00

family (up to 2 members). As much as 10.01 per cent of the respondents were having large of family (9 members and above).

The data presented in Table indicate that 76.66 per cent of the respondents were having annual income between Rs. 57,326/- to Rs. 2,82,190/-. However, 15.01 per cent of respondents were having high annual income *i.e.* Rs. 2,82,191/- and above. While 8.33 per cent respondents were in low annual income category *i.e.* income Rs. 57,325/- and below. It was noticed that majority (62.51%) of respondents were having low level of social participation followed by medium level of social participation (31.66%). While, 05.83 per cent of the respondents were having high level of social participation. It is observed that majority (72.50%) of respondents had medium level of economic motivation; followed by 17.50 per cent of the respondents were having high level of economic motivation. Whereas, 10.00 per cent of them had low level of economic motivation. The data of Table 1 also revealed that majority 80.01 per cent of the respondents were found to have medium cosmopolitaness. A very less percentage 10.83 and 9.16 per cent, respectively, had low and high cosmopolitaness.

It was also observed that majority (62.50 per cent) of respondents had possessed medium level of knowledge followed by 22.50 per cent had low and 15.00 per cent had high level of knowledge about IPM technology of cotton growing.

A critical look at the Table 2 revealed that respondents were very high adoption gap *i.e.* 91.66 per cent as observed about keeping proper spacing for rainfed cotton cultivation. Whereas observed (81.25 %) adoption gap about recommended dose of NPK. In case of chemical control of sucking pest by dimethoate and fipronil it was observed 80.00 per cent of adoption gap. 77.9 per cent of adoption gap was observed about adoption of recommended seed treatments at the time of sowing of cotton. Whereas, 71.25 per cent adoption gap was observed about grazing of sheep and goats after last picking. More adoption gap (70.83 %) was observed about installing perchers for birds.

Adoption gap about recommended height for sex pheromone trap was observed 70.83 per cent. Whereas 65.00 per cent of adoption gap was observed about control of bollworms by chloropyriphos. Further, result showed that, 60.83

**Table 2 : Distribution of respondents according to their adoption gap of recommended practices of IPM technology in cotton**

Sr. No.	Recommended practices	Adoption gap (%)
1.	Selection of medium to heavy well drained soil	35.00
2.	Use of 15-25 cl of FYM per ha.	57.50
3.	Grazing of sheep and goats after last picking	71.25
4.	Deep ploughing	6.66
5.	Use of 2.5-3.0 kg seed per ha. For Bt. cotton	3.33
6.	Sowing period for rainfed cultivation (15 June to 15 July)	2.08
7.	Seed treatment	77.91
8.	Proper spacing for rainfed cultivation (120 X 45 cm)	91.66
9.	Recommended first dose of half N and full P <sub>2</sub> O <sub>5</sub> and K <sub>2</sub> at the time of sowing	5.41
10.	Recommended dose of NPK per ha. (125:62.5:62.5)	81.25
11.	Depth of fertilizer application (5-10 cm)	37.91
12.	Sex pheromone trap (5-7/ha)	27.91
13.	Installing perchers for birds	70.83
14.	Spraying of 5% neem seed kernel extract	16.66
15.	2-3 sprayings of neem kernel after 15 days interval for biological pest control	47.50
16.	Use of Tricogramma cards	14.16
17.	Cryosparla conservation	60.83
18.	Control of sucking pest by Dimethoate, Fipronil	80.00
19.	Control of bollworms by Chloropyriphos	65.00
20.	Control of mealy bug by <i>Verticillium licani</i>	54.58
21.	Recommended height for sex pheromone traps (45 cm)	70.83
22.	Intercropping	10.41
23.	Intercultural operation and weed control (3 hoeings)	40.41
	Composite adoption gap	44.47

per cent of adoption gap was observed about crysoparla conservation. Whereas 57.50 per cent and use of recommended FYM per ha. in soil for better crop production. Further it was revealed that 54.58 per cent adoption gap was observed about control of mealy bug by *Verticillium licani*.

In mechanical practices, 47.50 per cent adoption gap was observed about number of sprayings of neem kernel after 15 days of interval for pest control. Further, the adoption gap about intercultural operation was observed 40.41 per cent. Adoption gap of 37.91 per cent gap was observed about proper depth of fertilizer application.

Further, from Table 2 it was concluded that adoption gap of 35.00 per cent was observed for type of soil recommended for cultivation of cotton. It was observed that there was 27.91 per cent gap in adoption of sex pheromone trap per ha. Further study revealed that only 16.66 per cent gap of adoption was observed about spraying of 5 per cent neem seed kernel extract. While studying the adoption gap about biological practices, respondents were having 14.16 per cent adoption gap for use of Tricogramma cards. Further, 2 revealed that adoption gap about intercropping was 10.41 per cent.

In case of deep ploughing before sowing of cotton, it was observed very low adoption gap (6.66 %). Majority of respondents comes under 5.41 per cent adoption gap about recommended first dose of half N and full P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub> at the time of sowing. It was also observed that respondents were having low adoption gap (3.33 %) about use of recommended seed rate (2.5-3.0 kg/ha) for Bt. cotton. Only 2.08 per cent adoption gap was observed about sowing period for rainfed cultivation.

Composite gap was determined by summation of adoption gap of all practices divided by number of recommended practices. From Table 2 it was observed that over all composite adoption gap about recommended practices of IPM technology by cotton growers were having 44.47 per cent, hence from obtained result it was concluded that 55.53 per cent of adoption was observed about recommended IPM technology.

#### Relationship between characteristics of cotton growers with adoption gap :

It was observed from Table 3 that out of ten independent variables, farm experience had positive and significant relationship with adoption gap of cotton growers regarding IPM technology in cotton at 0.05 per cent level of probability. Whereas education, annual income, social participation, cosmopolitaness and knowledge level had negatively significant relationship with adoption gap at 0.01 per cent level of probability. Remaining variables such as land holding, size of family and economic motivation had non-significant relationship with adoption gap of cotton growers regarding IPM technology in cotton.

**Table 3 : Relationship between the profiles of respondents with adoption gap of IPM technology in cotton**

Sr. No.	Category	Correlation coefficient 'r'
1.	Farm experience	0.204*
2.	Education	-0.671**
3.	Land holding	-0.182 <sup>NS</sup>
4.	Size of family	-0.026 <sup>NS</sup>
5.	Annual income	-0.250*
6.	Social participation	-0.425**
7.	Economic motivation	0.086 <sup>NS</sup>
8.	Cosmopolitaness	-0.341**
9.	Knowledge level	-0.782**

#### Conclusion :

It could be concluded that most of the respondents had medium level of farm experience. Farmers were educated up to secondary school level. One third of respondents (35.01%) were small farmers. The educated farmers know the importance of small family so the majority of farmers had medium family size and majority of farmers were grouped into medium annual income. Due to low knowledge, low encouragements and limited scope in social activity, the farmers possessed low level of social participation. Most of the respondents (72.50%) had medium level of economic motivation. Majority of the respondents (80.01%) had medium level of cosmopolitaness. Most of the respondents (62.50%) had medium level of knowledge level. As regards adoption gap, most of the respondents (61.66 %) had medium level of adoption gap. These findings are in line in the with observation made by Sorate (2011), Kumar ( 2011), Kadam (2003), Dhakne (2008) and Deshmukh *et al.* (2011).

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