

## Knowledge of Cotton Growers about Integrated Weed Management Practices

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### ABSTRACT

The present study was undertaken in Karanja and Manora Panchayat Samitis of Washim district in Vidarbha region of Maharashtra State. The findings revealed that majority of respondents belonged to middle age group ; educated up to college level; had middle family size (4 to 6 members), belonged to semi-medium size land holding category and agriculture was the main occupation, with annual income between of ₹ 1,00,001 to ₹ 2,00,000, had bi-seasonal cropping system, put up to 1.01 to 2.00 ha area under cotton crop; had medium sources of information; had medium category of extension contact; had medium level of economic motivation; had medium level of knowledge and adoption of integrated weed management practices. As regards the correlation analysis, independent variables namely education, land holding, annual income, cropping pattern, area under cotton crop, sources of information, extension contact and economic motivation showed a positive and highly significant correlation with knowledge of the respondents at 0.01 level of probability. Whereas, the characteristics such as age, family size, occupation had shown negative and non contributory effect with knowledge of the respondents.

**Keywords:** Knowledge, Cotton Growers, Integrated Weed Management

### INTRODUCTION

Cotton has played an important role in the Indian economy and still today cotton is a cash crop for many growers. India is the second largest exporter of cotton in the world after China. Cotton is grown during Kharif season. Its production is spread widely across India. Central India contributes more than 50 percent to the total production. In Maharashtra and Gujarat states, cotton is one of the best cash crop options during Kharif season. The highest area under cotton crop in Maharashtra state is represented by Yavatmal, Buldhana, Amravati, Akola districts of the Vidarbha region. Amravati district during the year 2013-14 recorded highest cotton productivity i.e. 543 kg/ha.

Weed is the serious problem in crop production and day-by-day, productivity of cotton crop is reducing due to weed infestation. Manual weed control is difficult due to paucity and high cost of labour during the peak period of the intercultural operations. The use of

herbicides provides better control, thereby reduce crop weed competition. The use of herbicides is most economical and easy way of controlling weeds. It increases yield up to 30 per cent. Even though, it had many relative advantage but most of the farmers have not recognized a need to control the weeds by using herbicides. The studies related to weed control revealed that, weed alone causes 5% loss in agricultural production in most developing countries and 10% loss in developing countries like India (Bhowmik, 1998).

To overcome the problem of weed control, the concept of integrated weed management (IWM) practices in cotton crop has been emerged. Integrated weed management can be defined as the use of 'many little hammers', that on their own are not stand alone weed control measures but, if applied in a systematic way, control weeds. This technique utilizes all suitable methods in a compatible manner as possible. It involves the strategic use of multiple tools for weed management including combinations of herbicides, crop rotation, mechanical and biological controls as well as other

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cultural practices designed to reduce damage by weeds. It is about putting components together and integrating them into existing crop production systems to produce a cropping system that resist weed invasion, tolerate weed presence and decrease population, survival and persistence of weeds.

Washim before separation as a district was one of the tahsil in Akola district and extensive area was under cotton cultivation as a Kharif season cash crop. Since the area and productivity of cotton in Washim district has significantly reduced in last two decades due to high cost of cultivation and low productivity, it was felt imperative to undertake a study on integrated weed management practices adopted by cotton growers in the district. It was also considered that findings of the study could be helpful to suggest remedies related to weed management for increase in production and productivity of the cotton growers in the district. The present study was therefore undertaken in Washim District with following specific objectives, to study the knowledge of cotton growers about recommended integrated weed management practices and to find out the relationship of selected characteristics of cotton growers with knowledge of integrated weed management practices.

### METHODOLOGY

The present study was conducted in Karanja and Manora Block in the Washim district. This two blocks were purposively selected as most of the farmers grow cotton crop as compared to other four Blocks of the district. Five villages viz. Khanapur, Kherda, Velegaon, Bhudshivani and Kakadshivani were selected from Karanja Block and five villages viz. Inzori, Hivera, Hatana, Khambla and Kupta were selected from Manora Block and 15 respondents from each village were selected to comprise a sample of 150 respondents. The respondents from each village were selected by random sampling technique. The data was collected with the help of pre-tested structured interview schedule developed for the present study by following the exploratory research design.

### RESULTS AND DISCUSSION

#### Knowledge about integrated weed management practices

Knowledge is a body of understood information by an individual. In present study, it refers to the knowledge possessed by cotton growers about IWM practices and to be followed by the respondents for increase in production and productivity

In all 52 application practices were included in present study to know the knowledge level of the respondents about IWM practices. The response received from the individual respondent for all IWM knowledge practices was then computed and converted into index and based on index range the respondents were distributed into three categories by equal interval method as given in below table 1

**Table 1: Distribution of the respondents according to their level of knowledge about IWM practices**

Knowledge index	Respondents (n=150)	
	Frequency	Percentage
Low (Up to 33.33)	14	9.33
Medium (33.34 to 66.66)	104	69.34
High (Above 66.66)	32	21.33
<b>Total</b>	<b>150</b>	<b>100.00</b>

The distributional analysis given in Table-1 reveals that, nearly seventy per cent of the respondents (69.33%) were observed to be in medium level of knowledge about IWM practices in cotton crop. It was followed by the respondents (21.33%) who had high level of knowledge and remaining 9.33 per cent) of the respondents were noted to be in low level knowledge. The low knowledge group might be the non adopters who were not following IWM practices in cotton crop. The findings thus conclude that majority of the respondents (90.67%) had medium to high knowledge level about selected IWM practices. These findings are similar with the findings earlier reported by Desai *et al.* (2000), Chopade and Ingle (2002), Jadhav (2008) and Kale *et. al.* (2014), who also noted that, majority of the respondents had medium level of knowledge about IWM practices followed by high level of knowledge.

#### Practice wise knowledge about Integrated Weed Management practices

To know the knowledge possessed by the respondents about IWM practices, 52 important recommended practices were considered (Table-2) & studied for accessing the knowledge of cotton growers about integrated weed management practices. The distribution of the respondents according to the knowledge of IWM practices was ascertained and accordingly depicted in below table 2.

**Table 2 : Distribution of the respondents according to their practice wise knowledge about Integrated Weed Management practices**

Integrated weed management practices	Respondents (n=150)	
	Frequency	Percent
<b>Knowledge about Cultural Weed Management practices</b>		
sowing time	150	100.00
Use of hand weeding	150	100.00

<b>Number of hand weeding</b>		
One at 25 DAS	140	93.33
One at 45 DAS	130	86.66
One at 65 DAS	110	73.33
Crop rotation	125	83.33
Cover crops	60	40.00
Use of smother crops (E.g. Cowpea, Green gram, Black gram, Sun hemp)	55	36.66
Use of Hoeing	135	90.00
<b>Time of hoeing</b>		
First at 20 DAS	130	86.66
Second at 40 DAS	125	83.33
Third at 60 DAS	110	73.33
Hand chipping	50	33.33
Irrigation management	110	73.33
Farm hygiene	135	90.00
Balance use of fertilizer (RDF)	55	36.66
<b>Intercrops</b>		
Cotton + Green gram (1:1)	140	93.33
Cotton + Black gram (1:1)	110	73.33
Cotton + Sun hemp (1:1)	7	4.66
Cotton + Sorghum + Pigeonpea + Sorghum (6:1:2:1)	58	38.66
Stale seed bed method	115	76.66
Broad bed furrow cultivation	10	6.66
<b>Knowledge about mechanical weed control</b>		
Ploughing	150	100.00
Harrowing	150	100.00
Inter-cultivation through blade harrow or deshi plough	120	80.00
Cleaning of machinery to prevent spread of weeds	30	20.00
<b>Knowledge about chemical weed control</b>		
Knowledge about name of recommended herbicide used for cotton	105	70.00
Knowledge about recommended per ha. dose of herbicide	61	40.66
Time of herbicide application (pre emergence/post emergence)	77	51.33
Use appropriate recommended doses	50	33.33
Name of pre sowing herbicide	18	12.00
Name of pre emergence herbicide for cotton (Eg. Pendamethalin, Diuron )	25	16.66
Name of post emergence herbicide for cotton (Eg. Pyriithiobac, Quizalofop, Glyphosate)	103	68.66
Knowledge about sufficient moisture in soil during herbicide application	141	92.00
Knowledge about types of spray pump used for spraying herbicide (knapsack spray pump )	110	73.33
Knowledge about types of nozzle used for herbicide application in cotton(Flat fan /flood jet type nozzle)	101	67.33
Knowledge about 500 lit of water to be used for herbicide application	40	26.66
<b>Precautions while using herbicide:-</b>		
Read the label before use	129	82.00
Wear goggles, rubber gloves before handling and use of chemicals	117	78.00
Knowledge about herbicide spraying during high speed wind and cloudy weather	145	96.66
Use of clean water for herbicide application.	138	92.33
Herbicide kept in a safe place	142	94.66
Dispose of empty containers	135	90.00
Knowledge about Separate sprayer to be used for herbicide application	123	82.00
Knowledge about intercultural operation within 4-5 days after herbicide application	131	88.88
<b>Knowledge about biological weed control</b>		
Use of biological control method	8	5.00
Precautions while using Bioherbicide	3	2.00
The bioagent not feed on other useful plants	2	1.33
Use of mycoherbicide (Eg. <i>Dactyleariahigginsii</i> )	5	3.33
Use of insects for control weeds (Eg. beetels <i>Zygogramma biocolorata</i> )	5	3.33
Use of fungi ,mites, nematodes	5	3.33

(Eg. <i>Pucciniacynodontys</i> )		
Use of birds like Geese	0	00.00
(for feeding on grasses or nuts edge in cotton)		

The knowledge about recommended cultural weed management practices to be followed for IWM possessed by respondents is depicted in 'A' section of Table-2 which reveals that, cent percent of the respondents (100.00%) were completely holding the knowledge about sowing time and intercultural operations viz. hand weeding respectively. As regards number of hand weeding to be followed at 25 DAS, 45 DAS, 65 DAS, it was observed that (93.33%), (86.67%) and (73.33%) of the respondents respectively were holding the knowledge about recommended weeding practice whereas 90.00 per cent and 83.33 per cent of the respondents were having knowledge about hoeing and crop rotation practices respectively with respect to the time to be followed for three sequential intercultural operation hoeing at 20 DAS, 40 DAS & 60 DAS, it was noticed that 86.66 per cent, 83.33 per cent and 73.33 per cent of the respondents respectively were possessing the knowledge about proper time of hoeing to be followed in cotton crop after sowing.

Regarding the knowledge about farm hygiene and irrigation management, it was observed that 90.00 per cent and 73.33 per cent of the respondents were having knowledge about farm hygiene and irrigation management. However it was strange to know that only 36.66 per cent were possessing knowledge about the balance use of fertilizers. In fact, recommended and balanced use of fertilizer is the pre requisite for healthy growth of crop for better yield on one hand and to maintain the soil health on other hand.

The knowledge about inter crops with cotton crop reveal that, majority of the respondents 93.33 per cent and 76.66 per cent and 73.33 per cent were having knowledge about inter cropping method i.e. Cotton + Green gram in 1:1 ratio, stale seed bed method and inter cropping method Cotton + Black gram in 1:1 ratio respectively. However, it was also noticed that, 38.66 per cent of respondents possessed the knowledge about recommended strip method of intercropping i.e. Cotton + Sorghum + Pigeon pea + Sorghum in 6:1:2:1 ratio.

The knowledge about mechanical weed control presented in 'B' section of Table-2 reveal that, majority of respondents were holding knowledge about weed control through the operations such as ploughing (100%), harrowing (100%) and inter cultivation through blade harrow or deshi plough (80%). However it was also noticed that only 20 per cent of the respondents were holding the knowledge about cleaning of

machinery for preventing the spread of weeds.

The knowledge about chemical weed control methods shown in 'C' section of Table-2 reveal that 92.00 per cent of the respondents were completely aware about present of sufficient moisture in soil during application of herbicide as regards knowledge about types of spray pump to be used for spraying herbicide, it was observed that 73.33 per cent of respondents were having knowledge of using knapsack sprayer for spraying to get the optimum results of herbicides. Further, it was observed that 70.00 per cent of the respondents were holding knowledge about recommended herbicides to be used for cotton along their technical and brand names. As regards names of post emergence herbicides (Pyrethiobac, Quisalofof, Glyphosate) to be applied for cotton crop and types of nozzles viz. flat fan/flood jet type nozzles to be used for spraying of herbicides in cotton, 68.66 per cent and 67.33 per cent of the respondents respectively were possessing the required knowledge.

The knowledge about precautions to be taken while using herbicides reveal that majority of respondents had knowledge about herbicide spraying during high speed wind and cloudy weather (96.66%), herbicides to kept in safe place (94.66%), use clean water for spraying of herbicides (92.33%), disposing the empty container after use of herbicides (92.00%), inter cultural operation with 4-5 days after application of herbicides (88.88%) and 82.00 per cent of respondents were having knowledge about reading the label before use herbicide and to use separate spray pump for application of the herbicides. The precautions to be taken during spraying of herbicides viz. wearing goggles, using rubber gloves while handling chemicals was also known to the 78.00 per cent of the respondents. Thus, it could be concluded that majority of the respondents were holding sound knowledge about precautions to be taken while handling and making use of the herbicides.

The knowledge about biological weed control methods given in 'D' section of Table- 2 reveal that, very low percentage of respondents (5.00%) were holding knowledge about biological control methods for control of weed in cotton crop. It was followed by 3.33 per cent of respondents who were having knowledge about use of mycoherbicide (eg. *Dactyleariahigginsii*), use of insects for weed control (eg. *Zygogramma beetle*) and use fungi, mites, nematodes (eg. *Puccinia cynodontys*) for control of weeds in the cotton crop respectively. Further, regarding knowledge about precautions to be taken while using bio- herbicides and bio agents and not to spray on other useful plants, only

2.00 per cent and 1.33 per cent of the respondents were having the knowledge respectively. The respondents were completely unknown about the use of birds like geese as bio-control method for control of weeds in cotton crop.

### Correlates of knowledge

It was assumed that personal, socio-economic, situational, communication and psychological characteristics influence the knowledge of the respondents and to know the effect and contribution of these characteristics, the correlation analysis worked out has been depicted in Table-3.

**Table-3: Correlation coefficient of selected characteristics of the respondents with their knowledge.**

Characteristics	Coefficient of correlation	
	'r' value	
Age	-0.254*	
Education	0.424**	
Family size	-0.0612	
Land holding	0.324**	
Annual income	0.339**	
Cropping pattern	0.326**	
Area under cotton	0.299**	
Sources of information	0.493**	
Extension contact	0.366**	
Economic motivation	0.460**	

\*\* - Significant at 0.01 % level of probability

\* - Significant at 0.05 % level of probability

The correlation analysis depicted in Table-3 reveal that, the characteristics viz., education, land holding, annual income, area under cotton crop, extension contact and economic motivation were highly significant at 0.01 level of probability and positively correlated with the knowledge of the respondents. The characteristics like age had negatively significant correlation with their knowledge at 0.05 level of probability. Family size had negative and not shown any contributory effect with knowledge of the respondents. Family size which show negatively but non-significant correlation with knowledge. For well educated farmers with more land holding, agriculture is the main occupation. They had high annual income, followed bi-seasonal cropping pattern, had more area under cotton, enthusiastically tried to get knowledge by contact with extension functionaries of different agencies for getting high yield of cotton and reducing losses caused by weed infestation, sources of information, extension contact and economic motivation which increased the extent of knowledge of farmers about IWM practices use in cotton.

## CONCLUSION

The findings of the present research study concluded that, majority of the farmers possessed of medium level of knowledge about Integrated weed management practices to be followed in cotton. It was also noticed that majority of farmers did not have knowledge about IWM practices like, smother crops, hand chipping, recommended dose of fertilizer, cleaning of machinery to prevent spread of weeds, 500 lit of water /ha to be used for herbicide application, biological weed management, quantity of water used for spraying herbicide and recommended dose of herbicide. Majority of the respondents were holding sound knowledge about the safety precautions to be taken while handling and using the herbicides. The knowledge about biological weed control methods reveal that, very low percentage of respondents were using biological weed control methods for weed controlling cotton crop. On the basis of findings, the present study implies that the related departments of government as well as non-governmental organizations should conduct various trainings followed by field demonstrations, crop demonstrations and other transfer of technology programmes for the cotton growing farmers, which will witness the significant result of IWM practices by the farmers themselves in their own setting and this will stimulate to create interest amongst the farmers to gain the accurate knowledge about IWM practices and to adopt the prerequisites of IWM practices for control of weeds in cotton crop in a scientific way.

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