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Knowledge and adoption of integrated management of white grub among the farmers

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Abstract

The present study was conducted in the Marathwada region of Maharashtra State with an objective to know the knowledge and adoption level of integrated management of white grub among the farmers and also to find out the constraints faced by them in its adoption. The data was collected from selected 120 respondents by personally interviewing them with the help of interview schedule. The data were analyzed with the help of frequency, percentage and standard deviation. The data showed that 53.34 percent of the respondents were having medium level of overall knowledge about integrated management of white grub. It was observed that 84.17 percent of them not collected white grub larva after ploughing or intercultural operations. Only 16.67 percent of them partially adopted the practice of installation of light trap. It was observed that none of the respondents adopted the practice of utilization of beneficial bacteria and nematode. The data indicated that 25.00 percent of them partially adopted the practice of pouring of recommended insecticides around the infested plants. Results also reported that 48.33 percent of the respondents were having medium level of overall adoption of integrated management of white grub. It was observed that 96.67 percent of them had faced the constraints of unavailability of inputs required for biological control of white grub, whereas 93.33 percent of them had faced the constraints of lack of scientific knowledge about proper application of biological control of white grub.

Keywords: Knowledge, adoption, IPM, white grub

Introduction

White grub is a polyphagous and nefarious pest of specific significance as it adversely affects crop productivity. It is rather difficult to eradicate this polyphagous and noxious pest because of its peculiar behaviour and nature of damage to the various crops. The pest can be managed effectively only by integration of several methods i.e. Integrated Pest Management (IPM) technology. Integrated Pest Management (IPM) is defined as a system that in the context of the associated environment and the population dynamics of pest species utilizes all suitable techniques and methods in a compatible manner as possible and maintain the pest population at level, below those causing economic injury. It is not simply the supreme position of control techniques such as chemical and biological control but the integration of all suitable management techniques with the natural regulating and limiting elements of the environment. Integrated management of pest technology emphasizes not only the reduction in use of pesticides and control the level of pest causing economic injury but also to facilitate the use of cultural, mechanical, biological and chemical methods of pest control. Thus it imply the farmers need to learn the principles of IPM technology and acquire the minimum knowledge and skill necessary to make self-decision based on specific farm condition and discourage the indiscriminate use of pesticides. It is an integrated approach including a combination of techniques depending on crop, climate and region. Emphasis is on surveillance and monitoring, conservation of natural enemies *viz.*, parasites, predators, pathogens *etc.* and better management of water and cultivation practices.

White grub has threatened the crop production in the some districts of Marathwada such as Parbhani, Hingoli, Beed, Nanded, Aurangabad, Jalna *etc.* since 2016-2017. This pest had destroyed the crops from 30 to 80 percent and in some cases 100 percent and had created havoc among the farming community of the Marathwada region. So keeping in view the importance in rainfed farming, the present study was conducted with following objectives;

1. To study the knowledge of the respondents about integrated management of white grub.
2. To study the adoption of farmers about integrated management of white grub.
3. To find out the constraints faced by the farmers in adoption of integrated management practices of white grub.

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Materials and Methods

The present study was conducted in the Beed, Parbhani and Hingoli districts of Marathwada region purposely as heavy infestation of white grub were noticed on large area during the year 2016-17. The data was collected from the respondents by personally interviewing them with the help of the specially designed interview schedule. From each district, four villages were selected randomly where severe out-break of white grub was observed since last year. Thus total 12 villages were selected for the present study. Ten farmers from each of the selected villages were selected randomly, thus a sample size of 120 was selected for the study. The data were analyzed with the help of frequency, percentage and standard deviation. Knowledge test was developed by framing suitable questions on integrated management of white grub. Score of knowledge

was done on the basis of respondent's response regarding knowledge about integrated management of white grub. A score of one was given to each correct answer and zero to wrong or no answer. The total score for each individual was calculated. The adoption score was worked out by assigning score of 2, 1 and 0 for full, partial and non-adoption for each of the integrated management practices of white grub, respectively.

Results and Discussion

1. Knowledge of the respondents about integrated management of white grub.

The knowledge of the farmers about each practice of integrated management of white grub is presented in Table 1.

Table 1: Knowledge of the farmers about each practice of integrated management of white grub. N = 120

S. No	Integrated Management Practices of White grub	Knowledge	
		Frequency	Percentage
(1)	Cultural method		
(a)	Two times deep ploughing as a preparatory tillage	57	47.50
(b)	Deep ploughing after <i>kharif</i> and <i>rabi</i> season in white grub infested field	52	43.33
(c)	Irrigation by flood method for killing of white grub larva	48	40.00
(d)	Use of well rotten FYM or compost	86	71.67
(2)	Mechanical Method		
(a)	Collection & killing of white grub larva after ploughing or inter-cultural operation in kerosene mixed water.	41	34.17
(b)	Collection of white grub beetles by shaking the trees and killing in kerosene mixed water after sunset.	26	21.67
(c)	Collection and killing of white grub beetles by installation of light trap.	37	30.83
(d)	Collection and killing of white grub larva after every inter-cultural operation in kerosene mixed water in infested field	32	26.67
(3)	Biological control		
(a)	Conservation of animal and bird for control of white grub	49	40.83
(b)	Use of <i>Bacillus popilliae</i> bacteria	03	02.50
(c)	Use of parasitic fungus <i>Metarhizium</i>	21	17.50
(d)	Use of beneficial nematode	00	00.00
(4)	Chemical control		
(a)	Drenching of 20 to 30 ml chlorpyrifos 20% or 4 gm of fipronil 40% + imidachloprid 40% mixed insecticide in 10 liter water around the infested plants.	54	45.00
(b)	Application of Phorate 10% WG 25 kg / ha or Carbofuran 3% CG 33 kg / ha in wet soil.	56	46.50
(5)	Eradication campaign at community level for management of white grub	12	10.00

I. Cultural practices

It was observed from Table 1 that 71.67 percent of the respondents having knowledge about the practice of use of well rotten FYM or compost, whereas 47.50 percent and 43.33 percent of them having knowledge about the practices of two times deep ploughing as a preparatory tillage and deep ploughing after *kharif* and *rabi* season in white grub infested field, respectively. Whereas 40.00 percent of them found to be well aware about irrigation by flood method for the infested crop useful practice for killing of white grub larva.

II. Mechanical practices

It was revealed that 34.17 percent of the respondent knowing the practice of collection and killing of beetles of white grub after ploughing or inter-cultural operation in kerosene mixed water, whereas 30.83 percent of them having knowledge about the practice of collection and killing of beetles of white grub by installation of light trap. As regards to collection of white grub beetles by shaking the trees such as *neem*, *babhul*, *ber* etc. and killing it in kerosene mixed water were known by 21.67 percent of the respondent, while 26.27 percent of them having knowledge about the practice of collection and killing of white grub beetles after every inter-cultural operations in kerosene mixed water in infested field.

III. Biological practices

It was indicated from Table 1 that biological practice like conservation of animals and birds for control of white grub were known by 40.83 percent of the respondents, whereas only 17.50 percent and 2.50 of them having knowledge about use of parasitic fungus *metarhizium* and bacteria *bacillus popilliae*, respectively. None of the respondent having knowledge about use of beneficial nematode as a biological control of white grub.

IV. Chemical practices

As regards to chemical practices, 45.00 percent and 46.50 percent of the respondents having knowledge about the practices of drenching of 20 to 30 ml chlorpyrifos 20 percent or 4 gm of fipronil 40 percent + imidachloprid 40 percent mixed insecticides around the infested plants and soil application of phorate 10 percent WB 25 kg / ha or carbofuran 3 percent CG 33 kg / ha, respectively.

V. Eradication campaign at community level for management of white grub.

Table 1 indicated that only 10.00 percent of the respondents having awareness about eradication of white grub on community bases as a campaign is one the important practices of Integrated Management.

2. Overall knowledge of the farmers about integrated management of white grub.

The data in Table 2 showed that 53.34 percent of the respondents were having medium level of knowledge about

integrated management of white grub. Whereas 38.33 percent of them were having low knowledge and only 8.33 percent of them were having high knowledge about integrated management practices of white grub.

Table 2: Distribution of respondents according to their overall knowledge of integrated management practices of white grub N=120

S. No.	Category	Frequency	Percentage
1.	Low (Up to 6)	46	38.34
2.	Medium (7 to 10)	64	53.33
3.	High (11 & above)	10	08.33

3. Adoption of integrated management practices of white grub by the farmers.

The practice wise adoption of integrated management of white grub by the respondents is presented in Table 3.

Table 3: Distribution of the farmers according to practice wise adoption of integrated management of white grub. N = 120

S. No.	Integrated Management Practices of White grub	Fully		Partially		No adoption	
		F	%	F	%	F	%
1.	Cultural method						
(a)	Two times deep ploughing as a preparatory tillage	28	23.33	77	64.17	15	12.50
(b)	Deep ploughing after <i>kharif</i> and <i>rabi</i> season in white grub infested field	31	25.83	70	58.33	19	15.84
(c)	Irrigation by flood method for killing of white grub larva	18	15.00	24	20.00	78	65.00
(d)	Use of well rotten FYM or compost	59	49.17	00	00.00	61	50.83
2.	Mechanical Method						
(a)	Collection & killing of white grub beetles after ploughing or intercropping operation in kerosene mixed water.	06	5.00	13	10.84	101	84.17
(b)	Collection of white grub beetles by shaking of trees & killing in kerosene mixed water after sunset.	00	00	02	1.67	118	98.33
(c)	Collection and killing of white grub larva by installation of light trap.	08	6.67	20	16.67	92	76.66
(d)	Collection and killing of white grub larva after every intercropping operation in kerosene mixed water in infested field	02	1.67	06	5.00	112	93.33
3.	Biological control						
(a)	Conservation of animal and bird for control of white grub	00	00	08	6.67	112	93.33
(b)	Use of <i>Bacillus popilliae</i> bacteria	00	00	00	00	120	100
(c)	Use of parasitic fungus <i>Metarhizium</i>	04	3.33	02	1.67	114	95.00
(d)	Use of beneficial nematode	00	00	00	00	120	100
4.	Chemical control						
(a)	Drenching of 20 to 30 ml chlorpyrifos 20% or 4 gm of fipronil 40% + imidachloprid 40% mixed insecticide in 10 liter water around the infested plants.	39	32.50	30	25.00	81	67.50
(b)	Application of Phorate 10% WG 25 kg / ha or Carbofuran 3% CG 33 kg / ha in wet soil.	26	21.67	36	30.00	58	48.33
5.	Eradication campaign at community level for management of white grub	00	00	00	00	120	100

I. Cultural practices

It was noticed that 64.17 percent of the respondents partially adopt the practices *viz.*, two times deep ploughing as a preparatory tillage, whereas 23.33 percent of them, fully followed recommended practice. Further it was revealed that 58.33 percent of the respondents partially adopt deep ploughing after *kharif* and *Rabi* season in white grub infested field, whereas 25.83 percent of them fully adopt this practices. It was also revealed that 20.00 percent of the respondents partially irrigated their field by flood method for killing of white grub larva and 15.00 percent of them fully irrigated their field by flood method as per recommendation. As regards to use of well rotten FYM or compost, 49.17 percent of the respondents fully adopted this practices as per recommendation, while 50.83 percent of them not adopted this practice.

II. Mechanical practices

It was observed from Table 3 that 84.17 percent of the respondents not collected white grub larva after ploughing or intercropping operation and killing in kerosene mixed water. Only 5.00 percent of the respondents fully adopted this practice whereas 10.84 percent of them partially adopted it. As regards to collection of white grub beetles by shaking the trees and killing beetles in kerosene mixed water, only 1.67 percent of them adopted this practice, whereas 98.33 percent of them not followed this. In case of collection of white grub beetles by installation of light trap, 16.67 percent of them

partially adopted it whereas 6.67 percent of them fully adopted it. Data further indicated that 93.33 percent of the respondents not adopted the practice of collection of white grub larva after every intercropping operations and killing them in kerosene mixed water in infested field. Only 1.67 percent and 5.00 percent of the respondents fully and partially adopted this practice, respectively.

III. Biological practices

In adoption of biological practices, it was observed that only 6.67 percent of the respondents partially adopted the practices of conservation of animal and bird for control of white grub. Further it was observed that none of the respondents adopted the practice of utilization of beneficial bacteria *Bacillus popilliae* and beneficial nematode for control of white grub in their field. Only 3.33 percent of the respondents used the parasitic fungus *Metarhizium* for control of white grub as a biological practices whereas only 1.67 percent of them partially adopted this practice.

IV. Chemical practices

The data indicates that in chemical practices of integrated management of white grub, 25.00 percent of the respondents partially adopted the practice of pouring of 20 - 30 ml chlorpyrifos 20 percent or 4 gm of fipronil 40 percent + imidachloprid 40 per cent mixed insecticide in ten liter of water around the infested plants. Whereas 32.50 percent of them, fully adopted this practice as per recommendation. As regards

to soil application of Phorate 10 percent WB 25 kg / ha or Carbofuran 3 percent CG 33 kg / ha when the field is wet, 30.00 percent of the respondents partially adopted this practice whereas 21.67 percent of them fully adopted it.

V. Eradication campaign at community level

As regards to eradication of white grub on community bases as a practice of integrated management of white grub, none of the village had adopted the practice.

4. Overall adoption of integrated management practices of white grub.

It is seen from Table 4 that 48.33 percent of the respondents were having medium level of adoption. Whereas 45.83

percent and 5.84 percent of the respondents were having high and low level of adoption of integrated management practices of white grub, respectively.

Table 4: Distribution of respondents according to their overall adoption of integrated management practices of white grub N=120

S. No.	Category	Frequency	Percentage
1.	Low (Up to 7)	55	45.83
2.	Medium (8 to 18)	58	48.33
3.	High (19 & above)	07	05.83

5. Constraints faced by the farmers in adoption of integrated management practices of white grub.

Table 5: Constraints faced by the farmers in adoption of integrated management practices of white grub. N = 120

S. No.	Constraints	Frequency	Percentage	Rank
1	Cultural method			
(a)	Lack of scientific knowledge about cultural method as integrated management practice of white grub	68	56.67	X
(b)	Unavailability of irrigation water for flood method	75	62.50	VIII
2	Mechanical method			
(a)	Lack of scientific knowledge about mechanical method as integrated management practice of white grub.	89	74.17	VI
(b)	Unavailability of labour required for mechanical control method	105	87.50	IV
(c)	High rate of hired labour required for mechanical method	91	75.83	V
3	Biological method			
(a)	Lack of scientific knowledge about biological control	112	93.33	II
(b)	Unavailability of inputs required for biological control	116	96.67	I
4	Chemical control			
(a)	Lack of scientific knowledge about chemical control	80	66.67	VII
(b)	Unavailability of chemical insecticide	54	45.00	XI
(c)	High cost of chemical insecticide	73	60.83	IX
5	Eradication campaign at community level			
(a)	Lack of knowledge about eradication campaign	108	90.00	III

Table 5 shows constraints faced by the farmers in adoption of integrated management of white grub. It was observed that 96.67 percent of the respondents had faced the constraints of unavailability of inputs required for biological control of white grub, whereas 93.33 percent of them had faced the constraints of lack of scientific knowledge about proper application of biological control of white grub. Lack of knowledge about eradication campaign had expressed by 90.00 percent of the respondents, whereas 87.50 percent of them expressed that unavailability of labour required for mechanical practices. Constraint of high rate of hired labour required for mechanical practices was expressed by 75.83 percent of the respondents. Lack scientific knowledge about mechanical method and chemical method of integrated management of white grub were expressed by 74.17 percent and 66.67 percent of the respondents, respectively.

In case of flood method of irrigation for control of white grub, 62.50 percent of the respondents expressed the constraints of non-availability of water. Constraints of high cost of chemical insecticide and lack of scientific knowledge about cultural method were expressed by 60.83 percent and 56.67 percent of the respondents, respectively. Whereas constraint of non-availability of chemical insecticide in the village was faced by 45.00 percent of the respondents.

This findings is in line with Chavan (2004)^[1], Girase *et al.* (2004)^[2], Zunjar (2011)^[2] and Sable (2012)^[3].

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