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Awareness of Rice (*Oryza sativa* L.) Farmers on Pest Control Measures in Three Districts of Andhra Pradesh

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ABSTRACT

A survey conducted among 27 farmers' in various mandals of Guntur, Prakasam and Krishna districts of Andhra Pradesh to assess the insecticide usage pattern of farmers in rice crop revealed that majority of the farmers approached progressive farmers (25.93%) and few of them approached input dealers, Village Agriculture Assistant (VAA) and scientists of Krishi Vigyan Kendra (KVK) (14.81%) for pest management advisory. Yellow stem borer and green leaf folder were the most predominant lepidopteran pests according to 80-85% of the farmers, and about 60-65% of farmers reported the incidence of brown plant hopper and green leaf hopper and maximum incidence of pests was noticed at tillering stage (100%), followed by boot leaf stage (92.59%) and panicle initiation stage (81.48%). Nearly 50 per cent of farmers initiated plant protection measures based on first appearance of pest and few of them (6.67%) followed the concept of economic threshold level (ETL) *i.e.* counting by regular monitoring of pests. The frequently used insecticides for the management of the pests in rice were chlorantraniliprole, acephate, dinotefuran, flubendiamide, pymetrozine and thiamethoxam. Among the frequently used insecticides, the spray frequency of chlorantraniliprole was maximum (33) followed by acephate (23), flubendiamide (22) and chlorpyriphos (11) during entire crop growth period. Less than 11.11 per cent of farmers were following label claim on the container and 59.26 per cent of them were unaware of different coloured triangles on insecticide bottles. Only about 14.81 per cent of farmers were using protective clothing during spraying operation and 51.85 per cent of them had awareness on effect of insecticides on soil microbes.

Keywords: *Pest management, Protection measures, Rice and Survey.*

Rice (*Oryza sativa* L.) is the most common cereal, serving as a staple food for approximately half of the global population. It provides 43 per cent of caloric requirement and 20-25% of agricultural income (Rao *et al.,* 2020). Over two billion people in Asia alone derive 80% of their energy needs from rice, which contains 80% carbohydrates, 7–8% protein, 3% fat, and 3% fibre (Juliano and Goddard, 1985). It also provides the bulk of daily calories for many domesticated animals and humans (Ryan, 2011). Rice is the principle food cultivated throughout Andhra Pradesh providing food for its growing population, fodder to the cattle, and employment to the rural communities (Hemasravanthi *et al.*, 2020). Any decline in its hectarage and production will have a perceivable impact on the state's economy and food security (Filimon *et al.*, 2015). Pesticides are an important and reliable tool in an integrated pest management (IPM) program to control crop pests. Farmers' habitually apply insecticides in high quantities without assessing the actual field requirements due to inadequate knowledge and lack of awareness. Cultural, mechanical and physical practices of pest control with low chemical

input form one of the most effective approaches for reducing insect pests in rice under a modern IPM methodology (Rahaman *et al.*, 2018). Pesticides if used injudiciously, they may pose serious health hazards to humans, domestic animals, natural enemies of crop pests and other forms of life through unwanted contamination of food, feed, water bodies and the environment. Therefore, it is necessary to be aware of the economic costs of pests, selection of appropriate pesticides, dose and formulation, as well as the effects of pesticides on the environment. Safe and effective use of pesticide can help achieve the target of sustainable and environmentally friendly agricultural production. It is therefore important that the pest management practices of farmers can be improved by examining current practices. The aim of the present paper is to examine the level of farmers' knowledge about insecticide usage pattern and various factors influencing this knowledge and to explore alternative ways of judicious use of pesticides in rice cultivation.

MATERIAL AND METHODS

Rice growing farmers were personally interviewed in Guntur, Prakasam and Krishna districts regarding the insecticide usage pattern followed by them in nursery, tillering, panicle initiation and before harvesting stages and their general awareness on pest control practices in rice with the help of a questionnaire. Three farmers were selected randomly from each mandal, covering three mandals from each district, thus making a total of 27 farmers. The data obtained was analysed by using mean, frequencies and simple percentages.

RESULTS AND DISCUSSION

The salient findings from the survey in line with the objective are as follows.

It was evident from Table 1. that most of the farmers' (80%) cultivating rice were middle-aged people with higher school education (33.33%). Majority of farmers' were small land holders (48.15%) and most of them sought help from the progressive farmers (25.93%) followed by Agriculture Extension Officer (AEO) (18.52%) regarding pest management practices in rice. The above finding was in line with the results of Kumari *et al*. (2016), Plianbangchang *et al*. (2009), Mukundarao (2011) and Jallow *et al*. (2017).

Yellow stem borer and green leaf folder were the most predominant lepidopteran pests according to 80-85% of the farmers, and about 60-65% of farmers reported the incidence of brown plant hopper and green leaf hopper. On the other hand, about 62.96, 66.67 and 25.93 per cent of them reported the incidence of gall midge, green leaf hopper and army worm, respectively (Table 2.).

Majority of the farmers noticed maximum incidence of pests (100%) at tillering stage followed by boot leaf stage (92.59%) and panicle initiation stage (81.48%) and nursery (44.44%) (Table 3.).

Most of the farmers (50%) initiated plant protection measures based on the first appearance of the pest irrespective of their number, crop stage and damage relationships. Thirty-three per cent of the farmers followed their neighbour and ten per cent of the farmers followed the calendar basis for initiating plant protection measures. Only few among them (6.67%) followed the economic threshold concept (ETL) by regular monitoring of pest population based on crop stage and their economic impact (Table 4.).

As a part of integrated pest management, 66.67 per cent of the farmers used insecticides, 14.81 per cent of farmers used biopesticides, 11.11 per cent of farmers adopted resistant varieties and only 7.41 per cent of farmers adopted cultural methods. Low adoption of IPM might be due to the non-availability

Table 1. Socioeconomic Characteristics of Rice Farmers (n=27)

S. No.	Particulars	Frequency	Percentage (%)
1	Age		
	Young age (<35 years)	3	10
	Middle age (36-55 years)	21	80
	Old age (> 56 years)	3	10
2	Education		
	Illiterate	4	14.81
	Functional Literate	1	3.7
	Primary school (1st to 5th class)	2	7.4
	Middle School (6th to 7th class)	5	18.51
	High school (8th to 10th class)	9	33.33
	Intermediate	5	18.51
	Graduate & Above	1	3.7
3	Farm size		
	Marginal (Up to 2.5 acres)	3	11.11
	Small (2.5 to 5 acres)	13	48.15
	Semi-medium (5 to 7.5 acres)	3	11.11
	Medium (7.5 to 10 acres)	2	7.41
	Large (>10 acres)	6	22.22
4	Extension contact with personnel		
	Village Agriculture Assistant (V.A.A)	4	14.81
	Agriculture Extension Officer (A.E.O)	5	18.52
	Mandal Agriculture Officer (M.A.O)	3	11.11
	Scientists of Krishi Vigyan Kendra (K.V.K)	4	14.81
	Progressive Farmer	7	25.93
	Input Dealers	4	14.81

Table 2. Main insect pests noticed by farmers in rice (n=27)

Name of the insect pest	No. of farmers	Percentage (%)
Yellow stem borer	23	85.18
Gall midge	17	62.96
Brown plant hopper	19	70.37
Leaf folder	22	81.48
Green leaf hopper	18	66.67
Army worm	7	25.93

Table 3. Insect pest incidence at various growth stages of paddy (n=27)

Growth stages	No. of farmers	Insect pest incidence (%)
Nursery	12	44.44
Tillering stage	27	100.00
Boot leaf stage	25	92.59
Panicle initiation stage	22	81.48
Milky stage	10	37.04

Table 4. General Awareness of Rice Farmers on Pesticides and their Usage (n=27)

S. No.	Particulars	Frequency		Percentage (%)	
1	Insecticide application				
	Calendar basis	3		10	
	Appearance of pests	17		50	
	Economic threshold level (ETL)	2		6.67	
	Neighbour' practice	5		33.33	
2	Adoption of IPM				
	Cultural methods	2		7.41	
	Biopesticides	4		14.81	
	Insecticides	18		66.67	
	Resistant varieties	3		11.11	
3	Insecticide class				
	OP compounds	27		100	
	Synthetic pyrethroids	10		37.04	
	Carbamates	7		25.93	
	Neonicotenoids	25		92.59	
	Phenyl pyrazoles	11		40.74	
	Chitin synthesis inhibitors	13		48.15	
	Diamides	27		100	
	Organochlorines	7		25.93	
	Pyridine azomethines	21		77.78	
4	Type of sprayer used				
	Taiwan sprayer	23		85.19	
	Power sprayer	4		14.81	
	Particulars	Frequency		Percentage (%)	
		Yes	No	Yes	No
5	Whether the farmer followed label claim (range of targeted pests on label) to any target pest	3	24	11.11	88.89
6	Awareness on different classes of insecticides	0	27	0	100
7	Awareness about different coloured triangles on insecticide bottles that indicate toxicity	11	16	40.74	59.26
8	Whether the recommended dose of insecticides is effective in pest control	19	8	70.37	29.63
9	Whether the farmer used any protective clothing while spraying	4	23	14.81	85.19
10	Whether the farmer has applied any insecticide directed towards the base of the plant	22	5	81.48	18.52
11	Awareness about precautions to avoid insecticide residues in soil	0	27	0	100
12	Awareness on effect of insecticides on soil microbes	14	13	51.85	48.15

Table 5. Frequency of insecticide doses used by farmers in Rice (n=27)

S. No.	Insecticide	No. of sprays	Recommended Dose		Higher Dose	
			Frequency	Percentage (%)	Frequency	Percentage (%)
1	Chlorantraniliprole	33	24	72.72	9	27.27
2	Flubendiamide	22	11	50.00	11	50.00
3	Acephate	23	17	73.91	6	26.09
4	Chlorpyriphos	11	4	36.36	7	63.64
5	Pymetrozine	16	6	37.50	10	62.50
6	Dinotefuran	15	7	46.67	8	53.33
7	Thiamethoxam	12	7	58.33	5	41.67

of the IPM inputs at farm level, the complexity of IPM modules for different crops, lack of information on the ill effects of toxic chemicals and lack of interest in clubbing with the existing insufficient extension networks. These findings were in line with the results of Ali *et al*. (2020).

Less than 11.11 per cent of farmers were following label claim on the container and 59.26 per cent of them were unaware of different coloured triangles on insecticide bottles that indicate toxicity. About 81.48 per cent of the farmers were applying insecticides directing towards the base of the plant against brown plant hopper. Only about 14.81 per cent of farmers were using protective aids during spraying operation and about 51.85 per cent of them had awareness on the effect of insecticides on soil microbes. However, 85.19 per cent of farmers were using taiwan sprayer for insecticide application (Table 4.). The above findings were in partial agreement with the results of Deviprasad *et al.* (2015) and Stadlinger *et al*. (2011) where negative health impacts of pesticides were reported by large number of farmers who are actively involved in spraying operations.

Among the 27 farmers under study, the frequently used insecticides for the management of the pests in rice included chlorantraniliprole, acephate, dinotefuran, flubendiamide, pymetrozine and thiamethoxam (Table 5.). From this it could be concluded that majority of the farmers were using diamide group of insecticides and organophosphates (100%), followed by neonicotinoids (92.59%), and pyridine azomethines (77.78%) (Table 4.).

Among the frequently used insecticides, the spray frequency of chlorantraniliprole was maximum (33) followed by acephate (23), flubendiamide (22) and chlorpyriphos (11). About 72.72, 50 and 73.91 per cent of farmers were using recommended doses of chlorantraniliprole, flubendiamide and acephate, respectively. On the other hand 63.64, 53.33 and 62.50 per cent of farmers were using higher doses of chlorpyriphos, dinotefuran and pymetrozine, respectively (Table 5.).

CONCLUSION

The consciousness level of farmers regarding usage of insecticides, using protective aids during spraying, following label claim on container and deleterious effect of insecticides *etc.* were highly minimal which might be due to the lack of awareness. Hence, it is in fact important to educate the farmer community in general and progressive farmers in particular related to plant protection aspects. By constant approach to the villages and organizing capacity building programmes on plant protection aspects and by involving the farmers in the segments

of training through the creation of interest, the gaps in plant protection practices can be eliminated.

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