

Original Research Article

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Utilization Pattern of Pesticides by Rice Growers in Thoubal District, Manipur, India

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ABSTRACT

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Manipur is one of the leading rice producing state. With the increase of the population, the requirement and demand of all crops has been tremendously increased. The role of pesticides has become critically important with modernization of agriculture. The present study has been undertaken about utilization pattern of pesticides by rice growers in Thoubal district, Manipur. The present study was conducted in Thoubal sub-division of Thoubal district, Manipur. 120 respondents were randomly selected for the study. The study revealed that majority of respondents i.e. 55.00 percent used two-three insecticides along with the fungicides and 63.33 percent used systemic + contact pesticides. The study also found that Pyrazosulfuron ethyl, Chlorantraniliprole and Carbendazim was ranked first among the herbicides, insecticides and fungicides respectively by the respondents.

Introduction

Rice (*Oryza sativa*) is among the three leading food crops of the world with maize and wheat being the other two. India has the largest area under rice cultivation, as it is one of the principal food crops. India is one of the leading exporters of rice in the world. West Bengal is the highest rice producing state in India with a total rice production of 14.97 Million Tonnes with a yield of 2926 kilograms per hectare in the year 2017-18 followed by Punjab, UP, AP, Bihar and Tamil Nadu (Agricultural Statistics at a Glance

2018). Among the North-Eastern states of India, Manipur is also one of the leading rice producing state owing to its salubrious climate and soil type. Agriculture sector contributes a major share to the total state domestic product and also provides employment to about 22.13 per cent (census 2011) of the total workers in Manipur. Out of the total geographical area of the state, only 7.41 per cent is used for cultivation. Of this total cultivated area, 52% is confined to the valley. Rice is the staple food and is grown in hill and plain areas and it accounts for about 97.7 % of the total foodgrain production of

the State in the year 2016-17. The rice production in 2016-17 is estimated as 4.93 lakh tonnes which is more than the preceding year's rice output of 4.33 lakh tonnes (Economic Survey Manipur 2017-18). In Manipur, rice cultivation dominates all other crops. With the increase of the population, the requirement and demand of all crops has been tremendously increased. However, the production of the crops has been decreased. The role of pesticides has become critically important with modernization of agriculture. In India, 76% of the pesticide used is insecticide while, 44% is used globally. Tremendous benefits have been derived from the use of pesticides in agriculture, which is an important sector upon which the Indian economy is largely dependent. In Manipur, rice is cultivated in almost all the sixteen districts of the state. Thoubal district is one of the leading rice producing districts in the state. In order to increase the rice production in the state, chemical fertilizers play an important role particularly when used with the high yielding varieties which are responsive to recommended doses of fertilizers to meet the requirement of people. Many of the farmers had faced the problems regarding poor knowledge in terms of pesticides doses, nature of chemicals, application details, etc. due to the lack of knowledge or illiterate. To overcome this problem the present study has been undertaken about utilization pattern of pesticides by rice growers in Thoubal district, Manipur.

Materials and Methods

The present study was conducted in Thoubal district, Manipur during the financial year 2018-19. Thoubal district was selected purposively for the study as the valley accounts for the highest consumption of pesticides for the rice cultivation. Among the sub division of Thoubal district, Thoubal sub division was randomly selected for the study.

Again, ten villages from this sub-division were selected based on farmer's availability and ease of communication. Total sample size of the study was 120 and from each village 10 per cent of the total people engaged in rice cultivation were interviewed randomly. Primary data was collected with the help of pre-tested semi-structured schedules. The data collected from the respondents were scored, tabulated and analysed by using appropriate statistical tools i.e., Mean, frequency, percentage and standard deviation.

Details of statistical techniques used

Mean

Mean was calculated by summing all respondent's score and dividing it by number of respondents. It was given as follows

$$\bar{X} = \frac{\sum X_i}{n}$$

Where,

\bar{X} = Mean

$\sum X_i$ = Sum of respondents score

n = No. of respondents

Frequency and percentage

The frequencies and percentage of respondents were worked out for comparison

Standard deviation

It is a measure of variability calculated around mean.

$$SD = \sqrt{\frac{\sum (X_i - \bar{X})^2}{n}}$$

Where,

X_i = Score of respondents

\bar{X} = Mean

n = Number of respondents

Results and Discussion

Socio-personal profile of the rice growers

From Table 1 it was revealed that 69.17 percent of respondents belong to the middle age group i.e. age group of 35 to 55 years followed by 15.83 per cent of them belonged to young age group i.e., upto 34 years and 15 percent of the respondents belonged to the old age group i.e., above 55 years of age. Similar finding was also reported by Zore *et al.*, (2017). For education 46.67 per cent of respondents had received graduation, 20.00 per cent respondents received higher secondary education, 18.33 per cent respondents received high school education, 6.67 percent respondents received middle school, 3.33 per cent respondents received primary education and 2.50 per cent of respondents received education of post graduate and above. However 2.50 per cent of respondents can read and write but none of them were illiterate and can read only. In case of size of family it was observed that majority of the respondent i.e., 62.50 per cent of the respondents had medium family size that is between 5 to 7 members in a family, followed by 31.67 per cent of them had small family size that is up to 4 members while 5.83 per cent of the respondents had large family size that is 8 members and above in a family. Similar finding was also reported by Iwuchukwu *et al.*, (2017). For the size of land holdings it was observed that 55.00 percent of the respondents had small size of land holding that is up to 1.00 ha, followed by 35.83 percent of the respondents had medium size of land holding that is 1.01 to 2.00 ha, while 9.17 percent of the respondents had large size of land holding that is above 2.00 ha. In case of social participation it was revealed that 56.67 percent of the respondents had no social

participation, followed by 29.17 percent respondents were member of one organization and 14.16 percent respondents were member of two or more organizations. None of the respondents were office bearer of any organization and wide public leader. For the level of source of information it was revealed that 62.50 percent of the respondent were using medium sources of information followed by 19.17 percent of the respondent used low sources and 18.33 percent used high sources of information. For the area under rice cultivation it was evident that 88.33% of the respondent had medium area under rice cultivation, followed by 7.50 % of the respondent had large area under rice cultivation, while 4.17% of the respondent had small area under rice cultivation. It was also observed that a majority (85.00 %) of the respondents had medium annual income followed by high annual income respondents (13.33%), whereas only (1.67%) of them had low annual income. Also, it was evident that 51.67 percent of the respondents belonged to medium risk orientation category, 42.50 percent respondents belonged to low risk orientation category and 5.83 percent respondents belonged to high risk category.

Utilization pattern of pesticides by the rice growers

It was observed from Table 2 that 55.00 percent respondents used two-three insecticides along with the fungicides, 24.17 percent respondents used no combination while 20.83 percent respondents used combination of any two pesticides. From Table 3 it was observed that 63.33 percent of the respondents used systemic + contact pesticides, followed by 25.83 per cent respondents used systemic pesticides and 10.84 per cent of respondents used contact pesticides. Similar finding was also reported by Landage (2015).

Table.1 Socio-personal profile of the rice growers

Sl. No.		Category	Frequency	Percentage	Mean	S.D
1.	Age	Young (upto 34 years)	19	15.83	44.65	10.33
		Middle (35 to 55 years)	83	69.17		
		Old (Above 55 years)	18	15.00		
2	Education	Illiterate	0	0		
		Can read only	0	0		
		Can read and write	3	2.50		
		Primary	4	3.33		
		Middle school	8	6.67		
		High school	22	18.33		
		Higher secondary	24	20.00		
		Graduate	56	46.67		
		Post graduate and above	3	2.50		
3	Family size	Small (upto 4 members)	38	31.67	5.17	1.42
		Medium (5 to 7 members)	75	62.50		
		Large (8 and above members)	7	5.83		
4	Size of land holding	Small (upto 1.00 ha)	66	55.00		
		Medium (1.01 to 2.00 ha)	43	35.83		
		Large (Above 2.00 ha)	11	9.17		
5	Social participation	None	68	56.67		
		Member of one organization	35	29.17		
		Member of two or more organization	17	14.16		
		Office bearer of any organization	0	0		
		Wide public leader	0	0		
6	Level of source of information	Low (upto 12 score)	23	19.17	17.85	5.54
		Medium (13 to 23 score)	75	62.50		
		High (Above 23 score)	22	18.33		
7	Area under rice cultivation	Small (upto 0.18 ha)	5	4.17	0.75	0.57
		Medium (0.19 to 1.32 ha)	106	88.33		
		Large (Above 1.32 ha)	9	7.50		
8	Annual income	Low (upto Rs. 14,000)	2	1.67	60741.66	46337.39
		Medium (Rs. 14,001 to 1,07,000)	102	85.00		
		High (Above Rs. 1,07,000)	16	13.33		
9	Risk Orientation	Low	51	42.50	16.71	2.22
		Medium	62	51.67		
		High	7	5.83		

Table.2 Distribution of the respondents on the basis of the combination of pesticides used

Sl. No.	No. of combinations	No. of respondents (N=120)	Percentage
1.	No combination	29	24.17
2.	Two-three insecticides along with fungicides	66	55.00
3.	Combine any two pesticides and used	25	20.83
	Total	120	100

Table.3 Distribution of the respondents on the basis of classification of pesticides used based on mode of action

Sl. No.	Based on mode of action	No. of respondents (N=120)	Percentage
1.	Systemic + Contact	76	63.33
2.	Systemic	31	25.83
3.	Contact	13	10.84
	Total	120	100

Table.4 Preferences of pesticides by respondents

Sl.No	Pesticides	Rank
A	Herbicides	
1.	Pyrazosulfuron ethyl	I
2.	2, 4-D	II
3.	Metsulfuronmethyl+Chlorimuron ethyl	III
4.	Pretilachlor	IV
5.	Bispyribac sodium	V
6.	Butachlor	VI
7.	Penoxsulam	VII
8.	Fenoxaprop-p-ethyl	VIII
B	Insecticides	
1.	Chlorantraniliprole	I
2.	Dichlorvos	II
3.	Lambda-cyhalothrin	III
4.	Imidacloprid	IV
5.	Phorate	V
6.	Thiamethoxam	VI
7.	Fipronil	VII
8.	Chlorpyrifos	VIII
9.	Quinalphos	IX
10.	Carbofuran	X
11.	Acetamiprid	XI
C	Fungicides	
1.	Carbendazim	I
2.	Propiconazole	II
3.	Tricyclazole	III
4.	Hexaconazole	IV
5.	Captan	V
6.	Copper oxychloride	VI
7.	Copper hydroxide	VII

From Table 4 it was revealed that among herbicides Pyrazosulfuron ethyl was ranked first by the respondents, followed by 2,4-D, Metsulfuron methyl+Chlorimuron ethyl, Pretilachlor, Bispyribac sodium, Butachlor, Penoxsulam and Fenoxaprop-p-ethyl. It also showed that among the insecticides, Chlorantraniliprole was ranked first by the respondents, followed by Dichlorvos, Lambda-cyhalothrin, Imidacloprid, Phorate, Thiamethoxam, Fipronil, Chlorpyrifos, Quinalphos, Carbofuran and Acetamiprid. Further it was observed that among fungicides, Carbendazim was ranked first by the respondents, followed by Propiconazole, Tricyclazole, Hexaconazole, Captan, Copper oxychloride and Copper hydroxide.

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