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Comprehension and perception of IPM technologies between rice growing farmers in Purvanchal region of Uttar Pradesh, India

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Abstract
A total number of 50 farmers from the 5 villages *viz*. Vishunpur, Gondi, Jasuri, Jeori and Tejopur were selected randomly to transfer of IPM technology in rice was undertaken in the villages of Chandauli district, in Purvanchal region of Uttar Pradesh. The IPM module for the particular region was refined and developed, validated and promoted with the use of appropriate scouting tactics, proper identification and diagnosis of insect-pests. The farmers of the selected villages were asked personally through a Questionnaire covering various aspects of IPM, socio-economic variables of farmers, comprehensions and constraints. IPM technologies have proved a track record of significantly reducing the reliance on the synthetic chemical pesticides, while improving quality, health and environmental issues. Thus the farmers were provided training on IPM technologies and were made aware of the benefit of increased productivity and reduce the pest damage.

Keywords: IPM technologies, rice, Purvanchal

Introduction
Uttar Pradesh is one of the most important rice producing states. The introduction of high yielding rice cultivars and adoption of intensive crop management practices although resulted in substantial increase in rice yields but at the same time it increased the occurrence of insect-pests (Adesina *et al.*, 1994, Bentley 1989, Kenmore *et al.*, 1987, Hobbs *et al.*, 1991, Hoeng and Escalada 1997) [1, 2, 3, 4, 5, 6, 7]. The indiscriminate use of synthetic chemical pesticides for the management of these pests led to disturbances in natural ecosystem, leading to resurgence of pests, toxic hazards and residues besides environmental problems. This dictated the need to look for other available alternatives and their use in an integrated manner. IPM is a pest management system that in the context of the associated environment and the population dynamics of the pest species, utilizes all suitable techniques and methods in as complete manner as possible and maintains the pest population at a level below those causing economic injury (Hoeng and Escalada 1997, Hoeng and Ho, 1987, Bjornsen 2003 and Brosius *et. Al.*, 1986) [5, 6, 7, 8, 9]. FAO defined IPM means the careful consideration of all available pest control techniques and subsequent integration of appropriate measure that discourage the development of pest population and keep pesticides and other interventions to levels that are economically justified and reduce or minimize risks to human health and the environment. The IPM programmes in rice gained momentum is inadequate in the Purvanchal Region of Uttar Pradesh. IPM programmes in the state is an attempt to promote ecological, economic and sociological outcomes which is accomplished by the best mix of control tactics by State Agriculture Department and State Agricultural Universities. The farmers were provided training on IPM and were made aware of beneficial insects and side-effects of indiscriminate use of pesticides. The IPM module was developed, validated and promoted with the use of appropriate scouting tactics, proper identification and diagnosis of pests and diseases, the use of action economic thresholds and conservation of naturally occurring biocontrol agents. (Fajardo *et al.*, 2000, Goodwell *et al.*, 1982 and Kenmore *et al.*, 1985) [10, 12, 11].
However, the study on the knowledge perception, adoption and constraints in IPM of important crop like rice has not been undertaken. The study on perception and adoption of the IPM and constraints impeding such options will facilitate in planning the future strategy.

Materials and Methods
The experiment was conducted by the Department of Agricultural Entomology, U.P. College

(An autonomous institution), Varanasi (U.P.) in the selected villages *viz*. Vishunpur, Gondi, Jasuri, Jeori and Tejopur in Chandauli district in Purvanchal region of Uttar Pradesh during the *Kharif* cropping seasons of 2017-18 and 2018-19. A total number of 50 farmers from these 5 villages were selected randomly. A Questionnaire covering various aspects of Integrated Pest management (IPM) technologies, socio-economic variables of farmers, comprehension and constraints was prepared and farmers were interviewed personally. Thus, the raw data were collected on the all above aspects were pooled and compiled. Statistically analyzed data tabulated and presented wherever necessary.

Results and Discussion

The analyzed data on socio-economic characteristics of the respondents are presented hereunder accordingly:

Age

The data revealed in the Table 1 section A., that the percentage of medium age group of farmers who adopted rice IPM technologies was very high (50.00) while percentage of old group farmers was very low (20.00). Young group of farmers came at second rank in adopting IPM technologies (30.00%). This also indicated that the young and medium aged group farmers played major role in implementing IPM programmes in rice in Purvanchal region of Uttar Pradesh.

Education

The education status of respondent farmers was found to be very high and it was 92.00 per cent while only 8.00 per cent farmers were found to be illiterate among the sample of the farmers who adopted IPM technologies (Table 1 section B.). This showed that the education of farmers played a critical role in quick adoption of IPM innovations.

Farm power and implements

The main source of farm power was the use of Tractors in this region. The study revealed that the 98.00 per cent of the farmers who adopted IPM technologies were using tractors (among them 18 per cent farmers have their own tractor and 80 percent of the farmers used tractor on rent) while only 2.00 per cent of farmers were using bullocks as a farm power (Table 1 section C).

Cropping pattern

Rice is major crop of this region and farmers take rice as main crop of *kharif* Season. Economy of the farmers of this region mainly depends on rice cultivation. 100 per cent farmers grow rice for commercial purpose and sell it to the state government and vendors of the local market after threshing. Some of the farmers sell it after milling. Wheat is the main crop of this region during *Rabi* cropping season and 90 per cent of the farmers grow this crop as main crop of the season. Farmers also grow vegetable crops like tomato, brinjal, chillies, peas and okra as cash crop and for domestic purpose. Some of the farmers also grow mustard and jowar/bajra in this region during *Rabi* and *Kharif* season respectfully, but mostly amongst well established resourceful farmers (Table 1 section D).

Training undergone by Farmers

The study revealed that the majority of the respondents had already got training from the Uttar Pradesh State Department of Agriculture and Banaras Hindu University, (BHU) Varanasi. 92 per cent farmers were attended one day training duration. Only 10.00 per cent of respondents got training in IPM of rice of more than one day duration while 8 per cent farmers were found untrained (Table 1 section E).

Contacts of farmers with extension workers

Farmers contacted with extension personnel was found to be very regular and frequent also. Majority of the farmers (84.00 per cent) were reported that they contacted the technical assistants, 62.00 per cent of respondents contacted to the scientists. While 42.00 per cent of the farmers consulted to the PPOs (Plant protection officers). farmers contacted to the officials frequently at least once a week (Table 1 section F).

Perception and awareness about IPM technology

The awareness of respondents about IPM practices in rice was studied by way of giving the farmers a set of practices (IPM modules for rice) and knowing their response about those practices. In all, the 20 practices were included under IPM technology and the extent of awareness was known by grouping the number of practices into low, medium, high and very high categories (Table 1 section G).

It was found that majority of the respondents (50%) were aware of 11-15 IPM practices and were categorized as high awareness 24 per cent of the respondent farmers categorized as medium awareness knowing 6-10 IPM practices, while 22% of rice growers were falling under very high awareness category knowing 16-20 IPM practices and only 4 per cent farmers were found in the very low category knowing 1-5 IPM practices. It is evident from the survey that the respondent's awareness about the IPM technology in rice was found to be towards higher side.

Perception towards IPM practices

The perception of respondents towards practices of IPM was analyzed under different farmers categories (Table 2). It is revealed from the table, 100 per cent of the farmers have positive perception towards the application of fertilizers in nursery as almost all of them felt that this helps in increasing vigorous growth of seedlings. 94 per cent of the respondents accepted that they observe their field by every 3-4 days of intervals and 92 per cent farmers agreed that, split application of nitrogenous fertilizers reduces the occurrence of pests and diseases. The percentage of respondents having positive perception was quite high in all categories. It was agreed by maximum number of farmers of different categories, particularly marginal ones (100%) that the field observation every 3-4 days after transplantation helped in immediate identification of pests and diseases.

This ultimately helped in quicker adoption of control measures thereby results in increased yield. The perception of majority farmers (ranging from 73.33% in case of small, 84% in marginal and 90% in large farmers respectively) about the decrease in the yield of most popular rice cultivar Mansuri transplanted after 45 days was also observed to be positive. The perception of majority of the farmers was positive in respect of the statement that higher dose of nitrogenous fertilizers increases the pests and disease problem in the rice cultivation.

Perception of respondents about the insects-pests control

The perception of respondents towards the control of insect's pests under IPM technology was analyzed according to the respondent farmer's category. Regarding it data presented in

the table 3.

It was observed that majority of the farmers (94.00%) from all categories had positive perception seen in respect of identification of stem borer in paddy. The positive perception was also about the identification of stem borer and gall midge at different stages of paddy particularly at the nursery stage (84% and 74% respectively) and the percentage of the marginal farmers was highest than other two categories. As regards the practices like control of stem borer by chemicals particularly by spraying of insecticides at the accurate stage the positive perception was observed majority of marginal and large farmers. The percentage of farmers about the perception towards the identification of insects-pests at tillering stage (Leaf hopper) was comparatively low. It can be highlighted that the percentage of small farmers about the different practices was comparatively low than marginal and large ones.

Perception of farmer about diseases of rice

It was further attempted to analyze the farmers perception about the diseases in paddy and their control under IPM technology. It was observed that majority of the farmers (88%) had positive perception about the blast attack on leaf and panicle of paddy plant. Similarly, the positive perception is also seen among fairly higher percentage of farmers (74%) about the control of blast by spraying of Hinosan. The percentage of small farmers having positive perception towards different practices about disease control was lower than the marginal and large farmers (Table.4).

Adoption of IPM technology

The adoption of different practices of IPM technologies was studied on the basis of total number of practices adopted by the farmers. In all, total 20 practices of IPM technology were studied and presented in the table 5. Thus the farmers adopted practices, five or less were grouped in low adoption category, those were adopting 6 to 10 were included in medium adoption category and those were following 11 to 15 practices were classified in high adoption category. While who following 16 to 20 IPM practices as per module were grouped in very high adoption category.

Table 5 clearly indicates that 50% respondents were following 11 to 15 practices of IPM technology. Thus following under high adoption category, while 18% of the farmers belong to very higher adoption category having followed 16to 20 IPM practices.

In conclusion, the study has amply demonstrated that effectiveness to IPM technology in terms of acquiring comprehension, perception and adoption of practices and creation of favorable opinion towards IPM technologies among the farmers. The study has established that the farmers knowledge about different practices of IPM technology has been substantially elevated which also reflected in the adoption of these practices (Berg, 2004).

Table 1: Observation on different socio-economic variables

Sl. No.	A. Age of the respondents			
Age groups (years)			**Respondents**	**Percentage**
1.	Young (upto 35)		15	30.00
2.	Medium (36-55)		25	50.00
3.	Old (56 and above)		10	20.00
B. Education of the farmers				
Education level			**Farmers**	**Percentage**
4.	Illiterate		4	8.00
5.	Literate	Read and write only	11	22.00
6.		Primary	21	42.00
7.		High School	8	16.00
8.		Graduate and above	6	12.00
C. Farm power and implements used				
Item			**Farmers**	**Percentage**
9.	Bullocks		1	2.00
10.	Tractor (Owned)		9	18.00
11.	Tractor (Rented)		40	80.00
12.	Power tiller		2	4.00
13.	Power sprayer		4	8.00
14.	Hand sprayer		32	62.00
15.	Duster		13	26.00
D. Major crops grown by selected farmers				
Crops			**Farmers**	**Percentage**
16.	Rice		50	100
17.	Wheat		45	90
18.	Jowar/Bajra		9	18
19.	Maize		8	16
20.	Tomato		16	32
21.	Brinjal		18	36
22.	Chillies		12	24
23.	Okra		10	20
24.	Peas		12	24
25.	Mustard		15	30
E. Farmers participation in training programmes				
Training duration			**Farmers**	**Percentage**
26.	One day		46	92.00
27.	Three day		5	10.00

28.	Not trained/attended	4	8.00
F. Contact of farmer with Technical contact/extension worker			
Technical contact		**Farmers**	**Percentage**
29.	Scientists	31	62.00
30.	Plant Protection officer	21	42.00
31.	SDO Agriculture	15	30.00
32.	Technical Assistant	42	84.00
G. Awareness about IPM technology			
Category (number of IPM practices)	**Farmers**	**CF**	**Percentage**
33.	Low (1-5)	2	2	4
34.	Medium (6-10)	12	14	24
35.	High (11-15)	25	39	50
36.	Very high (16-20)	11	50	22

Table 2: Perception towards production practices of IPM

Sl. No.	Practices	Frequency			
		Marginal (25)	Small (15)	Large (10)	Total (50)
1.	Higher dose of nitrogenous fertilizers increase pest problems	22 (88)	13 (86.67)	9 (90)	44 (88)
2.	Split application of nitrogenous fertilizers reduce the pests and diseases problems	24 (96)	13 (86.67)	9 (90)	46 (92)
3.	Observation of fields by respondents every 3-4 days	25 (100)	14 (93.33)	8 (80)	47 (94)
4.	Application of fertilizers in nursery give vigorous seedlings	25 (100)	15 (100)	10 (100)	50 (100)
5.	Yield will decrease of Mansuri variety transplanted after 45 days	21 (84)	11 (73.33)	9 (90)	41 (82)

Table 3: Perception of farmers about the insect-pests control

Insect-pest			Frequency			Total (50)
			MF(25)	SF (15)	LF (10)	
Identification of stem borer			23 (92)	14 (93.33)	10 (100)	47 (94)
Nursery plant root soaking protect from stem borer/gall midge			18 (72)	9 (60)	8 (80)	35 (70)
Earhead cutting caterpillar loss at grain hardening stage			11 (44)	6 (40)	5 (50)	22 (44)
Control of stem borer by chemicals			21 (84)	10 (66.67)	9 (90)	40 (80)
Tolerance variety for stem borer			17 (68)	9 (60)	7 (70)	33 (66)
Cv. Mansuri planted in August is attacked by gall midge			21(84)	10 (66.67)	10 (100)	41 (82)
Identification of gall midge			19 (76)	8 (53.33)	7 (70)	34 (68)
Stem borer can be control by the spraying of insecticide at the right stage			20 (80)	9 (60)	9 (90)	38 (76)
Control of stem borer by granular insecticide			18 (72)	9 (60)	7(70)	34 (68)
Identification of insecticides in Rice at different stage	Nursery	Stem borer	22 (88)	12 (80)	8 (80)	42 (84)
		Gall midge	21 (84)	9 (60)	7 (70)	37 (74)
	Tillering	Stem borer	15 (60)	7 (46.67)	6 (60)	28 (56)
		Leaf hopper	12 (48)	7 (46.67)	6 (60)	25 (50)
	Flowering	Gundhi bug	19 (76)	9 (60)	9 (90)	37 (74)

Table 4: Perception towards the diseases

Disease	Frequency			Total (50)
	MF(25)	SF (15)	LF (10)	
Mansuri attacked by blast	20 (80)	10 (66.67)	9 (90)	39 (78)
Blast attack on leaf and panicle of rice plant	22 (88)	13 (86.67)	9 (90)	44 (88)
Identification of blast	21 (84)	8 (53.33)	7 (70)	36 (72)
Blast can be controlled by Hinosan	21 (84)	9 (60)	7 (70)	37 (74)

Table 5: Adoption of IPM technology

Category (Number of IPM practices adopted)	Farmers	Percentage
Low (1-5)	3	6
Medium (6-10)	11	22
High (11-15)	25	50
Very high (16-20)	9	18

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