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Assessment of the Integrated Pest Management against Insect Pests of Paddy in Eastern Uttar Pradesh

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ABSTRACT

Krishi Vigyan Kendra, Jaunpur conducted frontline demonstrations on the integrated pest management technology in paddy at 25 farmers' field in two village *viz.,* Majhauli and Utreejpur of the district Jaunpur during *kharif* 2017 and 2018. IPM module comprised of recommended dose of fertilizers + clipping of rice seedling tips + pheromone traps with 5 mg lure @ 20 traps/ha against yellow stem borer for mass trapping + Spraying of NSKE 5% at 20 days interval + need based application of chlorpyriphos 20 EC @ 1.0 l/ha and carbofuron 3G @ 20 kg/ha. The results on paddy insect-pests infestation and yield indicated that integrated pest management was superior to farmers' practice. The minimum incidence of yellow stem borer (6.57 % and 5.85%) and leaf folder (5.12 % and 4.72%) was found in IPM module as compared to farmers' practice. The population of green leaf hopper and brown plant hopper was also less in IPM plots. There was 13.05 per cent more yield in IPM demonstration plots than control and the highest net return and benefit cost ratio was also obtained by application of recommended practices.

Key Words : Benefit Cost ratio, Brown plant hopper, IPM, Leaf folder, Yellow stem borer.

INTRODUCTION

India is the second largest producer and consumer of rice grown in the world after china. Uttar Pradesh is the second largest rice producing state of the country with an area of 5.9 Mha under rice cultivation. The average rice productivity of the district Jaunpur is about 25.48 q/ha. Rice crop is highly sensitive for several insect pests (Prashad, 2003; Singh and Singh,2017).The major factors that have contributed towards changes in the pest scenario were extensive cultivation of high yielding varieties, growing of varieties lacking resistance to major pests, intensified rice cultivation throughout the year providing constant niches for pest multiplication, imbalanced use of fertilizers, particularly application of high levels of nitrogen, non-judicious use of insecticides resulting in pest resistance to insecticides, and resurgence of pests and out breaks of minor pests (Prakash *et al*, 2014).

Among the major insect pests of rice are stem borers like yellow stem borer (*Scirpophaga incertulas*), belong to order Lepidoptera is the most destructive pest found all over the world. The presence of these insects in field is easily identified by dead heart or white ear in hills at vegetative stage and panicle at reproductive stages respectively (Sulagitti *et al*, 2018). *Nilaparvata lugens* (Brown plant hopper) and *Nephotettix virescens* (Green Leaf Hopper) belonging to order Hemiptera were identified or characterized by Hopper burn and yellow brown leaves in the field are also major insects of rice (Jadhao and Khurad, 2012). In India, moreover loss incurred due to a different insects pests of rice are reported to the tune of 15,120 million rupees which works out to be 18.60 per cent total losses (Chandramani *et al*, 2010).The rice leaf folder *Cnaphalocrocis medinalis* (Guenee) earlier considered as a minor pest has gained the

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status of major pest with the widespread of high yielding rice varieties and hybrids. Yield loss of 18.30 to 58.40 per cent was estimated due to the infestation of leaf folder which depends upon the stage of the crop at the time of infestation Non judicial and repeated application of insecticides at improper doses may causes several problems such as disrupting natural enemy complexes, secondary pest outbreak, pest resurgence, development of insecticide resistance and environmental pollution. Integrated Pest Management (IPM) is one of the eco-friendly approach which can be utilized to control the non-judicial uses of insecticides to control rice insect pest (Arvind *et al,* 2018; Trivedi and Ahuja, 2011). Realizing the benefits of IPM, International Rice Research Institute, Phillippines has been advocating rice IPM techniques and demonstrating their efficiency in the farm level since 1980 (Samiayyan *et al*, 2010). Therefore, in the present study, efforts were to test IPM modules, using minimum chemical insecticides.

MATERIALS AND METHODS

Krishi Vigyan Kendra, Jaunpur conducted frontline demonstrations on the IPM technology in paddy on farmers' field of district Jaunpur during *kharif* 2017 and 2018. The demonstrations on integrated pest management (IPM) on rice were conducted at 25 farmers' field in two village *viz.,* Majhauli and Utreejpur of the district. Altogether totally 25 demonstrations were laid out over an area of 10 ha. Further, soil samples were collected before transplanting from 15 and 30 cm depths. Processed soil samples were analyzed for pH, EC, organic carbon, available N, P and K. The pH of the soils ranged from 7.3-8.2, and organic carbon (%) ranged from 0.23-0.34. The status of soil organic carbon was low in all the soil samples. The available N, P and K contents of the soil varied from 185-220 kg/ha, 18-30 kg/ha and 180-250 kg/ha. Since the balanced use of these nutrients was essential for realizing the full potential of the variety, fertilizer recommendation on the basis of soil test data was recommended.

The experimental material consisted of two treatment schedules *viz.,* IPM (recommended practice) and non-IPM (farmers' practice). IPM module included recommended dose of fertilizer + clipping of rice seedling tips + pheromone traps with 5 mg lure @ 20 traps/ha against yellow stem borer for mass trapping + Spraying of NSKE 5% at 20 day interval + need based application of chlorpyriphos 1.0 l/ha and carbofuron 3G @ 20 kg/ha. The rice variety HUR-105 was used as test variety. The observations were recorded from recommended practice (IPM) and farmers practice (non-IPM). The data on stem borer infestation were recorded at vegetative stage as dead heart and total tillers and per cent incidence was worked out. Similarly, white ear and panicle bearing tillers were recorded near maturity of crop and per cent white ear infestation was worked out. Similarly, leaf folder damage was recorded from randomly selected 10 hills from each plot. For this, total number of leaves per hill and folded leaves were recorded and per cent incidence was worked out. The incidence of green leaf hopper (GLH) and brown plant hopper (BPH) were recorded from randomly selected 10 hills from each plot.

$$\text{Percentage of yellow stem borer} = \frac{\text{No. of dead heart or white ear in a hill}}{\text{Total no. of tiller in a hill}} \text{ X } 100$$

$$\text{Percentage of leaf folder} = \frac{\text{No. of folded leaves in one hill}}{\text{Total no. of leaves one hill}} \text{ X } 100$$

Economic parameters such as yield, cost of cultivation, net return and benefit cost ratio (BCR) were calculated by considering all inputs and outputs.

RESULTS AND DISCUSSION

The incidence of YSB was recorded 14.17 and 13.97 per cent in farmer practices in comparison to recommended practices which was recorded 6.57 and 5.85 per cent during both the year 2017 and 2018 respectively. Minimum leaf folder damaged leaves were recorded in IPM module demonstration plot as compared to farmers practice adopted plots. The incidence of GLH was observed minimum in

Table 1. Effect of Integrated Pest Management technology against insects- pests of rice.

Year	Treatment	% damage of YSB	% damage of Leaf folder	No. of GLH / hill	No. of BPH / hill
2017	Farmers' practice (Non IPM)	14.17	17.87	12.32	9.87
	Recommended practice (IPM)	6.57	5.12	4.98	4.10
	CD (P ≤ 0.05)	**6.08**	**9.14**	**5.28**	**4.15**
2018	Farmers' practice (Non IPM)	13.97	16.75	11.98	9.13
	Recommended practice (IPM)	5.85	4.72	4.53	3.92
	CD (P ≤ 0.05)	**4.96**	**8.83**	**5.22**	**4.16**

IPM plots 4.98 and 4.53 per hill in comparison to non IPM plots (12.32 and 11.98 per hill). Similarly, the population of BPH was recorded minimum in IPM plots 4.10 and 3.92 per hill in comparison to non IPM plots, 9.87 and 9.13 during the both year study. Similar finding have been reported by Vikram *et al* (2017).

During both year study, the average yield was recorded 54.57 q/ha in recommended practices whereas in non-IPM farmer practices it was found to be 48.44 q/ha. There was 13.05 per cent more yield was recorded in IPM demonstrations plots than non-IPM demonstrations. The loss of yield was due to improper management of insect-pests by the farmer. In non-IPM farmers also used non recommended and repeated doses of chemical fertilizers and pesticides like cyperethrine, Phorate 10G, chlorpyriphos + cypermethrine and other insecticide combinations resulting increased in cost of cultivation. The highest net return and benefit cost ratio was obtained by application of recommended practices. Benefit cost ratio of 2.08 and 2.13 was calculated in IPM rice in 2017 and 2018 season, respectively, in comparison to control plot which rendered 1.87 and 1.92 benefit cost ratio in respective season and year. The higher net return was obtained in IPM plot due to lower loss in yield caused by insects-pests compared to control plot.

CONCLUSION

The results of present study led to conclusion that yellow stem borer, leaf folder, green leaf hopper and brown plant hopper are major pests of rice in irrigated and rain fed lowlands rice. The yield

Table 2. Economic performance of paddy crop with recommended practices (IPM) and farmers' practice (Non IPM)

Year	Yield q/ha		Yield increase (%)	Cost of cultivation (Rs. /ha)		Net return (Rs. /ha)		Benefit Cost Ratio	
	FP (Non IPM)	RP (IPM)		FP (Non IPM)	RP (IPM)	FP (Non IPM)	RP (IPM)	FP (Non IPM)	RP (IPM)
2017	48.23	54.27	13.31	34815	35117	30295	38147	1.87	2.08
2018	48.65	54.87	12.78	35425	35897	32685	40921	1.92	2.13
Mean	**48.44**	**54.57**	**13.05**	**35120**	**35507**	**31490**	**39534**	**1.90**	**2.11**

FP= Farmers' Practice, RP= Recommended Practice

losses due to these pests can be managed by the application of IPM modules. It was also concluded that the demonstrated IPM module is eco-friendly and safer to non-targeted organism in comparison to conventional insecticides.

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