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ECONOMICS OF DIFFERENT INSECTICIDES AGAINST PEST COMPLEX IN RICE CROP

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Abstract: *The study was carried out to evaluate Economic feasibility of Different Insecticides against Pest complex in Rice Crop was conducted at Research Farm, BHU during kharif 2012. In the field, we tried to evaluate eight & seven treatments with three replication. The results indicated that Highest incremental benefit: cost ratio of 27.29:1 was recorded in case of Fipronil 200 SC @ 40g a.i./ha followed by Fipronil 200 SC @ 50g a.i./ha (23.41:1) and Chloropyriphos 20 EC @ 250g a.i./ha (21.31:1). The lowest benefit cost ratio (7.03:1) was recorded in Fipronil 80 WG @ 50g a.i./ha treated plot.*
Keywords*: Rice, Pest complex Fipronil, Benefit: Cost ratio.*

Introduction: In India, rice is the staple food for about 60% of the total population of the country [1]. Introduction and adoption of high yielding varieties of rice have no doubt augmented the production but it has led to unexpected changes in the ecosystem of rice fields, often resulting in pest flare ups. Rice crop has relatively a large number of insect pests especially in tropical regions. Since the crop is attacked by pests right from the time of sowing till it is harvested, inadequate crop protection in India has been causing an annual loss to the time of nearly 36% by insect pests alone [2]. Out of the various insect pests of paddy, brown planthopper, *Nilaparvata lugens* (Stål) and yellow stem borer, *Scirpophaga incertulas* (Walker) considered as a major pests in this region. Due to brown planthopper the loss in grain yield ranges from 10% in moderately affected fields to 70% in those severely affected [3], it damages the plants by transmitting virus diseases like grassy stunt, ragged stunt [4] and wilted stunt [5]. The yellow stem borer is the major damaging stem borer species and considered as serious pest of aromatic and lowland rice. It is a major constraint, responsible for low production of rice yield in almost the rice ecosystems, which caused 3-95% yield losses in India [6]. Hence, efforts were made to recognize the best insecticide on the basis of economic viability amongst different new chemical insecticides against the rice pests.

Materials and Methods

The investigations on "Economic feasibility of Different Insecticides against Pest complex in Rice Crop" was carried out at the Research Farm Department of Entomology, B.H.U. Varanasi (UP) during *Kharif*, 2012. The edaphic and climatic conditions of experimental site under which the experiments were conducted alongwith the techniques applied and materials used are being described here with.

Rice variety 'PHB 71' was grown in plot of size 4m × 2.5m at spacing of 20cm × 20cm with recommended agronomic practices.The experiment No.1 carried out with eight treatments *viz*., Fipronil 200 SC @ 30g a.i./ha, Fipronil 200 SC @ 40g a.i./ha, Fipronil 200 SC @ 50g a.i./ha, Fipronil 80 WG @ 50g a.i./ha, Fipronil 5 SC @ 50g a.i./ha, Chloropyriphos 20 EC @ 250g a.i./ha, Lambda Cyhalothrin 4.9% CS @ 12.5g a.i./ha. Treatments were replicated thrice in randomized block design. In the present experiment, brown planthopper, yellow stemborer ware monitored at regular

intervals and when damage reached the Economic Threshold Level, pesticides were sprayed as per the schedule laid out in two sprays. The insecticidal spray solution of desired concentration as per each treatment was freshly prepared every time at the experimental site just before the start of spraying operation. The quantity of spray was adjusted for its volume by adding remaining quantity of water. To this extract, the soap powder @ 0.2 per cent (200g/100 lit. water) was added to have a better coverage of material on the crop. The insecticides were sprayed by high volume knapsack sprayer using 500 liters of spray fluid per hectare. In the present experiment, brown planthoppers, yellow stem borer were monitored at regular intervals and when damage reached the Economic Threshold Level, granule application of pesticides was done. Granular formulations were mixed with sand and applied to the three plots of treatment in three replications were treated at a time. To avoid intermixing of treatment, about 20 to 30 cm thick false bund boundaries were prepared all around the plots having the treatments of granular insecticides. Harvesting was done on 1st November 2012 plot wise. Threshing and recording of grain yield was done on 11th November 2012. The yield per plot and treatment was converted to tones per hectare.

Estimation of Benefit: Cost Ratio: The economics of treatment was calculated in terms of benefit: cost ratio. The net income of each treatment over the untreated control was calculated taking the market price of produce and cost of insecticidal application of each treatment. The cost of treatment application included the cost of insecticide used, rent of sprayer and the spraying charges of labours/ha/ application.

The Benefit: cost ratio was computed using the following formula:

$$\text{Benefit : cost ratio} = \frac{\text{Monetary gain over control Rs/ha}}{\text{Cost of plant protection Rs/ha}}$$

Results and Discussion

Economic feasibility of treatments was determined to find out the cost effectiveness of treatments based on benefit: cost ratio. The maximum return was obtained from Fipronil 200 SC @ 40g a.i./ha treated plots as the benefit : cost ratio of this treatment was highest (27.29:1) followed by the treatment with Fipronil 200 SC @ 50g a.i./ha (23.41:1) Table-1 and Fig. 1. Other treatments also resulted in monetary gain as the benefit: cost ratio in descending order were as follows: Chloropyriphos 20 EC @ 250g a.i./ha (21.31:1), Lambda Cyhalothrin 4.9% CS @ 12.5g a.i./ha (20.73:1), Fipronil 5 SC @ 50g a.i./ha (17.89:1), Fipronil 200 SC @ 30g a.i./ha (17.63:1), Fipronil 80 WG @ 50g a.i./ha (7.03:1). The benefit : cost ratio of treatments revealed that Fipronil 200 SC @ 40g a.i./ha gave highest monitory return resulting in highest benefit : cost ratio followed by the Fipronil 200 SC @ 50g a.i./ha.

Table. 1 Economic feasibility of Different Insecticides in the management of pest complex in rice during *Kharif* 2012

Treatments	Dose (a.i. ha-1)	No. of Applications / spray	Quantity of Chemical (ml /ha)	Rate of chemical / (Rs L/kg)	Total cost of treatment application (chemical + spray+ labour) (Rs /ha)	Yield (t /ha)	Yield saved over control (t /ha)	Gross income (Rs/ha)	Value of saved yield (Rs/ha)	Net income (Rs/ha)	Benefit : cost ratio
Fipronil 200 SC	30	2	2×75=150	5600	1040	4.96	1.4	64976	18340	63936	17.63:1
Fipronil 200 SC	40	2	2×100=200	5600	1320	6.31	2.75	82661	36025	81341	27.29:1
Fipronil 200 SC	50	2	2×125=250	5600	1600	6.42	2.86	84102	37466	82502	23.41:1
Fipronil 80 WG	50	2	2×31.25=62.5	6350	4169	6.13	2.57	80303	33667	76134	7.03:1
Fipronil 5 SC	50	2	2×500=1000	1440	1640	5.80	2.24	75980	29344	74340	17.89:1
Chloropyriphos 20 EC	250	2	2×625=1250	410	713	4.72	1.16	61832	15196	61119	21.31:1
Lambda Cyhalothrin 4.9 % CS	12.5	2	2×127.55=255	700	379	4.16	0.60	54496	7860	54117	20.73:1

*Labour charge (for two sprays)= Rs. 150
* Rental value of sprayer (for two sprays) = Rs. 50
* Sale price of product (grain yield) = Rs. 1310 q/ha.

All treatments ware found to be effective as well as economical in reducing the incidence of brown planthopper and yellow stemborer. It has been wells documented that fipronil is effective against rice stem borer both as foliar application and granular application, due to its systemic activity and persistent toxicity. In the present findings, a similar result was obtained which is in line with [7,8] who reported that Cartap hydrochloride 50 SP @ 1 g/lit and fipronil 2.5

ml/lit recorded lowest per cent of white ears and leaf damage respectively. Such insecticides with higher cost benefit ration like fipronil could be recommended for the rice farmers of this region for planning a suitable pest management programme.

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