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Efficacy of Granular Insecticide against Yellow Stem Borer (*Scirpophaga incertulas*) on Basmati Rice

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ABSTRACT

Field experiments were conducted during *kharif* 2014-15 and 2015-16 seasons on Pusa Basmati 1121 to evaluate the efficacy and economy of granular insecticide against stem borer. The efficacy of 5 insecticides, *viz.,* regent 0.3G (fipronil) @ 15 kg/ha, ferterra 0.4 GR (chlorantraniliprole) @ 10kg/ha, padan 4G (cartap hydrochloride) @25kg/ha, foratox 10G (phorate)@ 12.5kg/ha, dursban 10 G (chlorpyriphos) @10kg/ha besides insecticidal check dursban 10 G (chlorpyriphos) @10kg/ha and untreated control was evaluated against Yellow Stem Borer. The stem borer infestation, i.e. white ears varied between 5.54 to 8.20 per cent over the *kharif* seasons. The results on stem borer infestation and yield indicated that all the granular insecticidal treatments were significantly superior to untreated control but these insecticides differed from each other with respect to their cost. Regent 0.3G (fipronil) @ 15 kg/ha followed by the ferterra 0.4 GR (chlorantraniliprole) @ 10kg/ha and padan 4G (cartap hydrochloride) @25kg/ha with 5.88, 6.48 and 6.68 average YSB infestation; and 19.87, 18.25 and 17.125q/ha average grain yields, respectively, were effective against YSB on basmati rice and increasing its yield but regent 0.3G had its additional advantage over ferterra 0.4GR and padan 4G as far as its cost of application in the field was concerned. The average cost of application of regent 0.3G, ferterra 0.4G and padan 4G comes out to be Rs. 1163/-ha, Rs. 1975/-ha and Rs. 2000/-ha i.e. one has to spend this much amount of money to get rid of the pest from an area of one hectare and hence, regent must be recommended to farmers keeping in view its efficacy.

Key Words: Granule Insecticides, Rice, Stem borer, Crop pest.

INTRODUCTION

Basmati occupies a special status in rice cultivation. Its rice is known for excellent cooking and eating qualities. However, basmati varieties occupy about 50-55 per cent rice area in the Haryana state. The infestation of yellow stem borer in Ambala district is more pronounced compared to other insect's larvae. It has attained major pest status with the introduction of high yielding basmati varieties and particularly in areas of high fertilizer use. Stem borers are responsible for significant losses (Shafique and Anwar, 1986). The yellow stem borer (*Scirpophaga incertulas*) is widely distributed throughout South and Southeast Asia (Heinrichs *et al*, 1985).

Among the insect pests, the yellow stem borer (YSB), *Scirpophaga incertulas* is the most important and devastating insect pest of basmati/aromatic rice verities. The insect is widely distributed throughout the rice growing areas in India. The insect has a number of host plants. The larva feed inside the stem causing drying of the central shoots or dead hearts in young plants. The insect causes drying of the panicles or white ears in older plants. The pest remains active throughout the year except between April and May and between October and November. The eggs are oval, flattened, and transparent at first and turn black before hatching. The caterpillars are tiny; black headed which bore into the stem from the growing point downward. The female is four

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winged. Colour is orange yellow with prominent black spots. Yellow stem borer causing yield losses to the tune of 27-34 per cent every year.

The economic threshold level for YSB have been determined to be in between 5 and 10% larval infestation levels (Prasad *et al*, 1992). The larvae of the stem borers, after hatching, bore into the rice plant and cut out the food supply to the upper part of affected stem, while the lower plant part remains green.The larval stage of stem borer mostly remains concealed inside the stem and is difficult to control.

As there is no full proof method to get rid of YSB either through a resistant variety or through certain biological agents, the use of insecticides becomes unavoidable. For quick knock down effect, the application of judicious dose of granular insecticides is desired to save the crop from toll of insects. Keeping in view of the above, in the present study, an attempt has been made to evaluate the efficacy and economy of new promising granular insecticides against YSB in basmati rice.

MATERIALS AND METHODS

The field experiments were conducted in randomized block design with four replications during *kharif* seasons 2014-15 and 2015-16. The plot size was (5x4) m^2 with 1.0 m replication border and 0.5 m treatment border between the plots. The experimental plots have been separated by raising bunds of about 0.6m height all around each plot. The basmati variety used in the present study was *Pusa Basmati* 1121, released from IARI (New Delhi) of 145 days duration and sown in the first fortnight of June. About 25-30d old seedling having 5 to 6 leaf stage was transplanted in first fortnight of July. Transplant two-three seedlings per hill in line at spacing of 20x15 cm (33 hills/sq. m). The crop was raised following standard agronomic practices of irrigation and Nitrogen (N_2) and Phosphorus (P_2O_5) fertilizers were applied @ 90:30 kg/ha. All P_2O_5 and 1/2 N_2 was applied at the time of transplanting and rest of N2 were applied at panicle initiation stage. The cultural practices were performed uniformly and equally to all the plots.

Six treatments included control with 5 granular insecticides *viz.,* regent 0.3G (fipronil) @ 15 kg/ha, ferterra 0.4 GR (chlorantraniliprole) @ 10kg/ha, padan 4G (cartap hydrochloride) @25kg/ha, foratox 10G (phorate)@12.5kg/ha, dursban 10 G (chlorpyriphos) @10kg/ha were used at vegetative and panicle formation stage respectively in recommended doses. All were replicated four times. Each demonstration was conducted in the farmer's field of 4 villages of Saha block of the Ambala district in agro-climatic zone-I of Haryana in irrigated condition on medium soils with low to medium fertility. To record the infestation of YSB, each plot was divided into 3 equal units for observation before harvesting. An area of 0.25 m^2 was selected from each unit and total panicle bearing tillers and YSB infested tillers, i.e. white ears (WE) were counted. Thus, a total of 20-27 hills (56-112 tillers) were sampled in each plot and infestation of YSB as per cent white ears have been worked out. Harvesting was done by the end of November. The yield data was recorded by excluding 2 border rows from all sides for each plot separately. The data have been analyzed statistically.

RESULTS AND DISCUSSION

The results regarding YSB infestation and yield were summarized in table 1. The YSB infestation varied from 6.22 to 7.74 and 5.54 to 8.20 per cent during *Kharif* seasons 2014-15 and 2015-16, respectively. The results on YSB infestation revealed that all the granular insecticidal treatments significantly superior to untreated control during the two *kharif* seasons. During the year 2014-15, regent 0.3G (fipronil) @ 15 kg/ha was most promising with 6.22 per cent YSB infestation. It was followed by the ferterra 0.4 GR (chlorantraniliprole) @ 10kg/ha and padan 4G (cartap hydrochloride) @ 25kg/ha with 6.60 and 6.70 per cent YSB infestation, respectively. These were comparable to check granule insecticide dursban 10 G (chlorpyriphos) @10kg/ha with 7.37 per cent YSB infestation and significantly superior to untreated control with 7.74 per cent YSB infestation.

Table1. Comparative efficacy and economy of new granular insecticides on YSB infestation in basmati rice.

Treatment			Yellow stem borer (% WE)			Yield (q/ ha)			Cost of application Rs./ha
Insecticide	Formulation	Dose (kg / ha)	2014-15	2015-16	Pooled	2014-15	2015-16	Pooled	Average
T1-Regent (Fipronil)	0.3G	15	6.22	5.54	5.88	19.50	20.25	19.87	1163
T2-Ferterra (Chlorantraniliprole)	0.4 GR	10	6.60	6.36	6.48	17.75	18.75	18.25	1975
T3- Padan (Cartap hydrochloride)	4G	25	6.70	6.66	6.68	17.25	17.00	17.12	2000
T4-Foratox (Phorate)	10G	12.5	7.92	6.30	7.11	15.75	16.50	16.12	938
T5-Dursban (Chlorpyriphos)	10 G	10	7.37	7.08	7.22	13.25	13.75	13.50	1000
T6- Control			7.74	8.20	7.97	12.25	13.50	12.87	-
C.V.			28.18	24.56		15.03	11.42		-
C.D.			10.60	9.29		3.64	2.88		-

However during the year 2015-16, regent 0.3G (fipronil) @ 15 kg/ha followed by the ferterra 0.4 GR (chlorantraniliprole) @ 10kg/ha and padan 4G (cartep hydrochloride) @25kg/ha with 5.54 , 6.36 and 6.66 per cent YSB infestation, respectively, were most promising and significantly superior over untreated control with 8.20 per cent YSB infestation. The check granule insecticide dursban 10 G (chlorpyriphos) @10kg/ha was also effective with 7.37 and 7.08 per cent YSB infestation, respectively, during the year 2014-15 and 2015-16. Thus on an average the pooled data indicated that regent 0.3G (fipronil) @ 15 kg/ha, ferterra 0.4 GR (chlorantraniliprole) @ 10kg/ha and padan 4G (cartap hydrochloride) @25kg/ha with 5.88, 6.48 and 6.68 per cent YSB infestation, respectively, were most promising insecticides.

The grain yield data also revealed that all the granule insecticidal treatments were significantly superior to untreated control and comparable to check insecticide dursban 10 G (chlorpyriphos) @10kg/ha. The yield data indicated that regent 0.3G (fipronil) @ 15 kg/ha followed by ferterra 0.4 GR (chlorantraniliprole) @ 10kg/ha and padan 4G (cartep hydrochloride) @25kg/ha with 19.50, 17.75 and 17.25 q/ha grain yields, respectively, were significantly superior to untreated control with 12.25 q/ha yields during 2014-15. However during the year 2015-16, regent 0.3G (fipronil) @ 15 kg/ha followed by ferterra 0.4 GR (chlorantraniliprole) @ 10kg/ha and padan 4G (cartap hydrochloride) @25kg/ha with 20.25, 18.75 and 17.00 q/ha grain yields, respectively, were significantly superior to untreated control with 13.50 q/ha grain yields.

The average grain yield of two seasons indicated that regent 0.3G (fipronil) @ 15 kg/ha, ferterra 0.4 GR (chlorantraniliprole) @ 10kg/ha and padan 4G (cartap hydrochloride) @25kg/ha were most promising with 19.87, 18.25 and 17.12 q/ha average grain yields, respectively, in comparison to check granule insecticide dursban 4G @10 kg/ha and untreated control with 13.50 and 12.87 q/ha average grain yields, respectively.

There must be two criteria based on which the insecticide should be selected for application in the field i.e. besides its efficacy, the cost of its application should also be taken into account. As far as the efficacy of the mentioned granular insecticides is concerned, all were found effective but these insecticides differed from each other as far as their cost of application in the field was concerned. The average cost of application of Regent 0.3 G, Ferterra 0.4G and Padan 4G comes out to be Rs. 1163/ha, Rs. 1975/ha and Rs. 2000/ha i.e. one has to spend this much amount of money to get rid of the pest from an area of one hectare.

CONCLUSION

It may be concluded that although regent 0.3G (fipronil) @ 15 kg/ha, ferterra 0.4 GR (chlorantraniliprole) @ 10kg/ha and padan 4G (cartap hydrochloride) @25kg/ha were effective in controlling YSB on basmati rice variety and increasing its yield but regent 0.3G had its additional advantage over ferterra 0.4GR and padan 4G as far as its cost was concerned and it must be recommended to farmers keeping in view its efficacy.

REFERENCES

Heinrichs E A, Medrano F G and Rupasas H R (1985). *Genetic evaluation for insect resistance in rice*. International Rice Research Institute, Los banos, Laguana, Philippines, 356 pp.

Prasad S S, Gupta P K and Singh R B (1992). Economic threshold level for yellow stem borer, *Scirpophaga incertulas* (Walker) in deepwater rice. *Nat Acad Sci Letters* **15** : 235-236.

Shafiq M and Anwar M(1986). Effect of transplanting time on the borer attack and yield and yield of rice cultivars. *Proc Pakistan Congr Zool* **6**: 89-92.

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