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Evaluation of Emulsifiable Concentrate and Granules Formulation of Chlorantraniliprole against Rice Stem Borer in Basmati Rice

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ABSTRACT

Present study was conducted to assess the effectiveness of granular and liquid formulation of Chlorantraniliprole *i.e.* Chlorantraniliprole 0.4% GR (Ferterra) and Chlorantraniliprole 18.5% SC (Coragen) at farmers' field. Chlorantraniliprole in both granular and liquid formulation for the management of stem borer in basmati rice gave better results than the recommended insecticides as well as the control where no insecticide was applied. The experiment was conducted in three districts of Punjab *viz*, Patiala, Jalandhar and Ludhiana at three locations each. Crop sown during the month of June and transplanted in the month of July following all the recommended practices was selected for the study. The dead hearts incidence and white earheads were significantly low in Ferterra and Coragen at all the locations. Number of dead hearts recorded before spray was above the economic threshold level of 2 per cent at all the locations, while after five days and ten days of spray, a significant reduction was recorded. Similar trend was observed in the per cent white ear produced (0.29-1.11 % as compared to 3.59 % in Patiala, 2.32-3.13 % as compared to 6.30 % in Jalandhar and 1.83-2.15 as compared to 4.23% in Ludhiana). Paddy yield under both the formulation of chlorantraniliprole was significantly higher than that of the control.

Key Words: Basmati rice, stem borer, Ferterra, Coragen, yield.

INTRODUCTION

Rice is the primary source of food for more than half of the world's population. In Punjab it was grown on an area of 30.46 lakh hectare with the production of 188.63 lakh ton on an average in year 2016-17 (Anon, 2018). The major huddle in high production of basmati rice is the insect pest that causes heavy losses to the crop. Pests like stem borer and leaf folder were considerable minor pests in basmati rice but after the introduction of short duration, high fertilizer consumption and high yielding varieties, these pest have became the major insect pests of basmati rice. The caterpillars of yellow stem borer bore into the stem of the plant which in turn central shoot withers and produce a dead heart. Farmers rely heavily on insecticides for pest management. Many conventional insecticides though have been evaluated against such insects, yet most of the chemicals have failed to provide adequate control. Hence, new molecules are being added for their evaluation with aim to restore environmental quality. Chlorantraniliprole insecticide powered by active ingredient Rynaxypyr®, has a unique mode of action controlling pests resistant to other insecticides while its selectivity to non-target arthropods conserves natural parasitoids, predators and pollinators. It has remarkably low mammalian toxicity, favorable toxicological profile and very low use rates. The present study has been undertaken keeping in view the severity of stem borer during *kharif* season and to incorporate green and eco-friendly molecules for its management.

MATERIALS AND METHODS

During *kharif* season 2012-13, three locations each having 500 m^2 area per treatment per replication in 3 districts of Punjab *viz,* Patiala, Jalandhar and Ludhiana were selected to observe the field

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efficacy of emulsifiable concentrate and granular formulations of chlorantraniliprole. Basmati rice fields were sown during the month of June and transplanted in the month of July following all the recommended agronomics practices (Anon, 2012). Granular molecule, ferterra 0.4G @ 10 kg/ha and liquid formulation, Coragen 18.5 SC @ 150 ml/ha were tested and compared against recommended and commonly used insecticides Padan 4G @ 25 kg and Durasban 20 EC @ 2.5 l/ha. One plot was kept as untreated control at every location to record the damage caused by the pest for comparison. The emulsifiable insecticides were applied by dissolving in 250 l of water, using manual knapsack sprayer, using hollow cone type nozzle while the granule after mixing with sand were broad casted in field, after observing the economic threshold level. The observations on stem borer infestation were recorded based on dead hearts produced at vegetative stage and white ear heads at maturity. Pest-counts were recorded as number of dead heart/ white ear head and total number of tillers / panicles from 10 randomly selected hills per treatment per replication. The observations were recorded at 5 and 10 days after application and compared with pre-treatment pest-count. The per cent incidence (dead heart/white ear head) was calculated using the formula:

$$\text{Dead heart incidence (\%)} = \frac{\text{Number of dead hearts per hill}}{\text{Total number of tillers per hill}} \times 100$$

$$\text{White ear head incidence (\%)} = \frac{\text{Number of white ear heads per hill}}{\text{Total number of ear heads per hill}} \times 100$$

The yield was recorded on whole plot basis and calculated to per hectare basis. The data thus obtained from all observations were analyzed using randomized block design with environments.

RESULTS AND DISCUSSION

The observations recorded revealed that both the granular and liquid formulations of Chlorantraniliprole were highly effective in management of stem borer in basmati rice. EC formulation *i.e.* Coragen recorded lowest incidence (0.59%) of stem borer followed by granular formulation *i.e.* Ferterra (0.75%) and other insecticides (Padan and Durasban). All the tested chemicals were significantly superior and effective in controlling yellow stem borer (Table 1). In Jalandhar district, Ferterra was highly effective after 5d of application, whereas in other two districts Coragen was highly effective in management of rice stem borer among the other treatments. Considering pool data of districts, both the formulations of Chlorantraniliprole (Coragen and Ferterra) were at par and significantly gave better results in controlling stem borer at vegetative stage. In all three districts, Padan gave less control to stem borer as compared to new molecule. These may be due to excess and indiscriminate use of these chemical at early stage of the plant when there was no damage in the field.

After 10d of spray, dead heart incidence reduces to the range of 0.09 – 4.46 per cent with minimum per cent dead heart in coragen 18.5 SC treatment and maximum in untreated plots. All the insecticides were significantly effective in managing rice stem borer, recorded least dead heart with the range 0.09-1.09 per cent followed by Ferterra with 0.30 -1.03 per cent which was numerically less than Padan (0.48-1.10 %) and with Durasban (1.0-0-1.19 %). Pool data show both Chlorantraniliprole formulations weree at par with each other and significantly better than the other treatments. Least per cent dead heart was recorded in coragen 18.5 SC (0.61 %) followed by Ferterra (0.69 %). It showed the liquid formulation was better than granular formulations of Chlorantraniliprole. All the treatments were effective in controlling stem borer as compared to control. Replacing old insecticide with new molecule *i.e.* green molecule was cost effective, low dose, safe to natural enemies. Earlier pesticides were highly persistence in nature that causes harmful effect on environment. These green molecules were eco-friendly in nature. These finding were in agreement with Sarao and Kaur (2014) who

Table 1. Effect of various insecticides for the management of stem borers in basmati rice.

Treatment	Dead hearts (%)								White ear head (%)			
	5 DAS**				10 DAS							
	Patiala	Jalandhar	Ludhiana	Pooled mean	Patiala	Jalandhar	Ludhiana	Pooled mean	Patiala	Jalandhar	Ludhiana	Pooled mean
Ferterra 0.4 GR	0.56 (4.22)*	0.45 (3.39)	1.41 (6.81)	0.75 (4.63)	0.30 (2.72)	0.82 (4.93)	1.03 (5.82)	0.69 (4.37)	0.60 (4.38)	2.32 (8.41)	1.83 (7.78)	1.56 (7.50)
Padan 4G	0.88 (5.28)	0.58 (4.34)	1.51 (7.06)	0.95 (5.43)	0.48 (3.43)	1.10 (5.77)	0.82 (5.20)	0.80 (4.77)	0.97 (5.55)	2.68 (9.20)	1.86 (7.83)	1.84 (7.50)
Coragen 18.5 SC	0.21 (1.84)	0.52 (3.75)	1.21 (6.31)	0.59 (3.76)	0.09 (0.85)	0.76 (4.62)	1.09 (5.98)	0.61 (3.63)	0.29 (2.66)	2.68 (9.26)	2.02 (8.18)	1.63 (6.57)
Durasban 20 EC	0.80 (5.15)	0.62 (4.26)	1.30 (6.54)	0.88 (5.21)	1.03 (5.81)	1.00 (5.58)	1.19 (6.26)	1.07 (5.85)	1.11 (6.00)	3.13 (10.07)	2.15 (8.44)	2.13 (8.15)
Control	2.52 (9.11)	3.27 (10.28)	3.23 (10.35)	2.98 (9.98)	3.11 (10.09)	4.46 (11.93)	3.27 (10.41)	3.64 (10.85)	3.59 (10.83)	6.30 (14.41)	4.23 (11.87)	4.76 (12.42)
L.S.D. (p=0.0 5	(1.58)	(1.60)	(0.06)	(0.97)	(1.78)	(1.04)	(0.12)	(1.03)	(1.62)	(1.14)	(0.05)	(0.89)

* Figures in parenthesis are √arc sin per cent values.

**DAS: Days after spray.

Table 2. Per cent white ear head produced and yield of treated and untreated fields of paddy.

Sr. No	Treatment	Yield (q/ha)	Yield increase over control (Per cent)	Per cent increase in yield
T_1	Ferterra 0.4 GR	36.74	10.02	27.27
T_2	Padan 4G	36.09	9.37	25.96
T_3	Coragen 18.5 SC	36.67	9.95	27.13
T_4	Durasban 20 EC	35.52	8.80	24.77
T_5	Control	26.72	-	-

reported ferterra was better in managing stem borer in basmati rice.

Liquid formulation of Chlorantraniliprole was significantly better (1.63 %) than other treatments whereas all other treatments were at par and recorded better than control (4.76 %). Chlorantraniliprole in both granular and liquid formulation for the management of stem borer in basmati rice gave better results than the recommended insecticides as well as control where no insecticide was applied. Bhunaneswami and Raju (2013) reported that Chlorantraniliprole reduced the incidence of leaf folder and stem borer. Sachan *et al* (2018) and Justin and Preetha (2014) also revealed from field experiments that Chlorantraniliprole 0.4 GR was proved to be the best insecticide that reduced stem borer infestation and recorded higher yield.

Yield

The grain yield data revealed that the treated plots yielded 24.77 to 27.27 per cent more basmati per hectare than the plot where no insecticide was applied (Table 2). However, among different treatments, the difference in yield increase was very less. Both formulation of Chlorantraniliprole gave highest yield in comparison to other insecticides.

CONCLUSION

It was observed that among the tested insecticides Chlorantraniliprole gave better results than Cartap Hydrochloride or Chlorpyriphos. Moreover, the new molecule Chlorantraniliprole was significantly better in the management of paddy stem borer in both of the districts. Number of dead hearts recorded before spray were above economic threshold level at all the locations, while after five days and ten days a reduction was recorded.

REFERENCES

Anonymous (2012). Package of practice for *kharif* crop. Punjab Agricultural University, Ludhiana.

Anonymous (2018). Package of practice for *kharif* crop. Punjab Agricultural University, Ludhiana.

Bhuvaneswari V and Raju SK (2013). Compatibility of fungicides and insecticides targeting sheath blight and major rice pests. *J Rice Res* **6**(2):64-69

Justin CGL and Preetha G (2014). Survey on the occurrence, distribution pattern and management of stem borers on rice in Kanyakumari District, Tamil Nadu. *J Ento and Zoo Studies* **2** (6): 86-90

Sachan SK, Kashyap AK, Sharma R, Verma KD and Singh HR (2018). Efficacy of some novel insecticides against yellow stem borer, *Scirpophaga incertulas* (Walker) in Basmati Rice. *J Pharma and Phytochem* SP1: 195-197

Sarao PS and Kaur H (2014). Efficacy of ferterra 0.4% GR (Chlorantraniliprole) against stem borers and leaf folders insect pests of basmati rice. *J Environ Bio* **35**: 815-819.

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