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RESEARCH ARTICLE

IMPACT OF SOME NOVEL CHEMICAL INSECTICIDE ON THE INCIDENCE OF ROOT BORER, *EMMALOCERA DEPRESSSELLA* (SWINHOE) IN SUGARCANE

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ABSTRACT

Field experiments were conducted at Crop Research Centre of Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, Uttar Pradesh, India during 2013-14 and 2014-15 using randomized block design to evaluate some novel insecticides against root borer, *Emmalocera depressella* and their effect on natural enemies' population in sugarcane. All the treatments were found significantly effective in reducing the infestation of root borer compared with control. Chlorantraniliprole 0.4 GR @ 18 kg/ha was found most effective in reducing the incidence of root borer among all treatments. The treatment chlorpyrifos 25 EC @ 5lit/ha was recorded least effective in minimizing the pest problem.

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INTRODUCTION

Sugarcane, *Saccharum officinarum* L., is one of the most important cash crops which provides raw material to sugar industry, was first grown in South East Asia and Western India. In India, it occupies an area of about 5.01 million hectares with total production of 352.1 million tones and productivity 68.25 tons per hectare. In Uttar Pradesh, sugarcane is grown in about 2.25 million hectares with total production of 130.5 million tonnes and productivity 59.0 tonnes per hectare (Anonymous, 2015). There are many factors which are responsible for this low yield, among them severe attack of insect pests at early and mature stages of crop are the most significant one. Root borer, *Emmalocera depressella* (Swinhoe) also a problem after early shoot borer and top borer in Western Uttar Pradesh.

Sugarcane is a long duration crop of 10-18 months and therefore is liable to be attacked by a number of insect pests. Around 2660 insects belong to 44 species and 10 orders have been reported in sugarcane field (Xavier and Merlindayana, 2012). So many insecticides are recommended for the control of borers in sugarcane from a long period. Therefore, field evaluation of some new insecticidal formulations which are available in the markets is required.

MATERIALS AND METHODS

Field experiments were conducted at Crop Research Centre of Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, Uttar Pradesh, India during 2013-14 and 2014-15. The experiment was laid out in Randomized Block Design with 8 treatments replicated thrice in 6X5 m sq plot size with a spacing of 90X15 cm. Healthy setts of sugarcane variety Co 0263 was planted during the fourth week of March 2013 and 2014. Four newer insecticides namely, chlorantraniliprole 18.5 SC, chlorantraniliprole 0.4 G, fipronil 0.3 GR and cartap hydrochloride 4 G along with three

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conventional insecticides *i.e.* chlorpyrifos 20 EC, phorate 10 G and carbofuran 3 G were tried and compared with an untreated plot control. The root borer, *E. depressella* caused yellowing of leaves in the grown up canes, fine hole below the soil into the shoot and drying of one or two open leaves along with dead heart which cannot be pulled out easily. Six middle rows were selected from each treated and untreated plot for further investigations. Calculate the per cent incidence of borer by using the following formula.

$$\% \text{ incidence} = \frac{\text{Number of infected plant}}{\text{Total number of plant}} \times 100$$

Thereafter, calculate the reduction percentage over control by using the following formula.

$$\% \text{ reduction} = \frac{\text{Control} - \text{Treatment}}{\text{Control}} \times 100$$

18.5 SC, cartap hydrochloride 4 G, fipronil 0.3 GR and chlorpyrifos 25 EC with 40.14, 34.72, 28.45, 25.65 and 25.10 per cent reduction, respectively. However, chlorpyrifos 25 EC was found to be least effective (16.63 per cent) in reducing the incidence of root borer compared to other treatments in the year 2013-14 (Table 1). The same trends were observed in the next year *i.e.* 2014, as the lowest incidence of 5.06 per cent was observed with chlorantraniliprole 0.4 GR followed by, carbofuran 3G, phorate 10 G, fipronil 0.3 GR, chlorantraniliprole 18.5 SC, cartap hydrochloride 4 G and chlorpyrifos 25 EC with mean incidence as 6.47, 6.69, 7.30, 7.88, 8.61 and 8.99 per cent, respectively. All the treatments were statistically superior to the untreated (10.97 per cent) control. The highest reduction of 53.93 per cent was observed with chlorantraniliprole 0.4 GR followed by carbofuran 3G, phorate 10 G, fipronil 0.3 GR, chlorantraniliprole 18.5 SC, cartap hydrochloride 4 G and chlorpyrifos 25 EC with per cent reduction as 41.11, 39.05, 33.52, 28.24, 21.58 and 18.10 per cent, respectively. Carbofuran and phorate were found most effective against root borer in sugarcane is close related

Table 1. Effect of some novel chemical insecticide on the incidence of *Emmalocera depressella* (Swinhoe)

S. No.	Treatment name	Dose/ha	Per cent Cumulative incidence of Root borer (2013-14)	Per cent reduction over the control	Per cent Cumulative incidence of Root borer (2014-15)	Per cent reduction over the control
1	Cartap hydrochloride 4 G	25 kg	9.20 ^b	25.65	8.61 ^b	21.58
2	Chlorantraniliprole 0.4% GR	18 kg	6.58 ^a	46.84	5.06 ^a	53.93
3	Chlorantraniliprole 18.5 SC	350 ml	8.85 ^b	28.45	7.88 ^b	28.24
4	Chlorpyrifos 25 EC	5 lit.	10.31 ^b	16.63	8.99 ^b	18.10
5	Fipronil 0.3 GR	25 kg	9.27 ^b	25.10	7.30 ^b	33.52
6	Phorate 10 G	25 kg	8.08 ^a	34.72	6.69 ^a	39.05
7	Carbofuran 3 G	33 kg	7.40 ^a	40.14	6.47 ^a	41.11
8	Control	-	12.37 ^c	0.01	10.98 ^c	0.00
	F test		Sig.		Sig.	
	SE (m)		0.56		0.60	
	CD (0.05%)		1.74		1.97	

Statistical analysis

Analysis of variance (ANOVA) and mean comparison will be calculated using OP STAT software. For comparison of means, the Least Significant Difference at Test <0.05 will be implemented.

RESULTS AND DISCUSSION

Effect of some novel chemical insecticide on the incidence of *Emmalocera depressella* (Swinhoe)

Among all the treatments chlorantraniliprole 0.4 GR was found more effective with lowest incidence of 6.58 per cent in the year 2013 (Table1). The next best treatment were carbofuran 3 G and phorate 10 G, with 7.40 and 8.08 per cent incidence and was statistically at par in minimizing the infestation with the best treatment *i.e.* chlorantraniliprole 0.4 GR. This was followed by chlorantraniliprole 18.5 SC, cartap hydrochloride 4 G and fipronil 0.3 GR with 8.85, 9.20 and 9.27 per cent incidence, respectively. Chlorpyrifos 25 was the least effective with 10.31 per cent incidence. The highest incidence as 12.37 per cent was recorded from control plot. The result revealed that chlorantraniliprole 0.4 GR recorded highest per cent reduction of 46.84 and found to be the best treatment followed by carbofuran 3G, phorate 10 G, chlorantraniliprole

to the finding of Patel *et al.* (1993) and Sardana (2001). The present findings are in agreement with the observations of Kumar *et al.* (2010) who reported that phorate 10 G and chlorpyrifos 10 G were most effective against *E. depressella*.

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