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Original Research Article

Bio efficacy of Novel Insecticides against Capsule Borer *Antigastra catalunalis* (Duponchel) in Sesame

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Keywords

Antigastra catalunalis, Sesame, Bio-efficacy, Novel Insecticides

A B S T R A C T

A field experiment was conducted at Main Agricultural Research Station, Raichur during *Kharif* 2015 to evaluate the bio efficacy of insecticides against capsule borer, *Antigastra catalunalis* (Dup.) on sesame. The results revealed that application of chlorantraniliprole 20 SC @ 0.20 ml/l and spinosad 45 SC @ 0.12 ml/l was considered as the best insecticides by recording minimum larval population, highest per cent of reduction over control, least damage of capsules and highest grain yield.

Introduction

The sesame, *Sesamum indicum* Linn., is the oldest oilseed crop with maximum production (25.8%) and the largest area (29.8%) as well as highest (40%) export in India. Seed of sesame contains 46 to 64 per cent oil, 26.25 per cent protein, high amount of minerals such as calcium, iron and phosphorus (Anon., 2015). The crop is attacked by 38 insect pests and the numbers vary (up to 67) from each environmental conditions (Rai, 1976) among them, sesame shoot webber and capsule borer (*Antigastra catalaunalis* [Dup.]) is the most serious and detrimental pest throughout India, infesting the crop at leaf, flower and capsules stage causing yield loss up to 68.2 per cent (Ahuja., 1990).

Presently chemical control is the most important practical method against increased capsule borer infestation in sesame. Keeping these in view the present study was undertaken to test the relative efficacy of some novel insecticides.

Materials and Methods

The experiment was conducted at Main Agricultural Research Station, University of Agricultural Sciences, Raichur during *kharif*- 2015. The experiment was laid in randomized block design (RCBD) with twelve treatments (seed treatment with imidacloprid 60 FS @ 7.50 g /kg, spinosad 45 SC @ 0.12 ml/l, chlorantraniliprole 20 SC @ 0.20ml/l, emamectin Benzoate 5 SG @ 0.20 g/kg, profenophos 50 EC + nuvan 76 EC @2.00+0.50 ml/l, prophenophos 50 EC @ 2.00 ml/l, bifenthrin 10 EC @ 0.50 ml /l, azadiractin 1500 ppm @ 3.00 ml/l, lamdacyhalothrin 5 EC @ 0.50ml/l and untreated control) were replicated thrice and the plot size was 5m x 5 m with spacing of 30 cm x 10 cm. The Recommended doses of fertilizers and agronomical practices were adopted (Anon., 2015). Two applications were given *viz.*, first spray was done at 30 days after sowing and second spray at 15 days after first spray.

The observations on capsule borer larva were taken one day before spraying, three and ten days after first and second spray and mean number of larva per plant were calculated. The grain yield was recorded at harvest. The data was analysed by following the statistical procedure suggested by Gomez and Gomez (1984) to work out means, standard deviation (SD) and correlation coefficients.

Results and Discussion

First spray

The larval population among the treatments a day before spray varied from 1.90 to 2.16 larvae per plant. However, no significant difference was observed among the treatments (Table 1).The data recorded at three days after spray indicated that chlorantraniliprole 20 SC was found to be superior by recording lowest larval population (0.28 larvae/ plant) which was on par with spinosad 45 SC (0.46 larvae/plant), lamdacyhalothrin 5 EC (0.53 larvae/plant). This was followed by emamectin benzoate 5 SG (0.66/plant), bifenthrin 10 EC (0.80/plant) and profenophos 50 EC+nuvan 76 EC were recorded 0.66, 0.80, 0.86 larvae per plant, respectively. Highest larval population was recorded in untreated control (2.36 larvae/plant) which was inferior over all the treatments.

Ten days after spray

Larval population varied significantly among the treatment after 10 days of first spray. Among these chlorantraniliprole 20 SC excelled by recording minimum larval population (0.15/plant) and was on par with spinosad 45 SC (0.40/plant) and lamdacyhalothrin 5 EC (0.4/plant). This was followed by emamectin benzoate 5% SG, bifenthrin 10 EC, profenophos 50 EC + nuvan 76 EC recorded with larval population 0.55, 0.76 and 0.76 larva per plant, respectively and superior over control. Significantly maximum number of larvae (2.6/plant) was recorded in untreated control.

Second spray

Three days after spray

The data recorded on larval population at three days after second spray revealed significant variation between the treatments (Table 1). Chlorantraniliprole 20 SC was found superior by recording significantly lowest larval population of capsule borer (0.13/plant) followed by spinosad 45 SC (0.36/plant), lamdacyhalothrin 5 EC (0.43 per plant) and emamectine benzoate 5 SG (0.53 /plant). Azadirachtin 1500ppm and seed treatment with imidacloprid which recorded higher larval population of 1.69 and 1.76 per plant. Untreated control was found to be inferior by recording significantly highest larval population of 2.76 per plant.

Ten days after spray

It is evident from the data that at ten days after spray chlorantraniliprole 20 SC recorded significantly minimum larval population (0.03/ plant) was on par with spinosad 45 SC (0.16/ plant). The next best treatments were lamdacyhalothrin 5 EC, emamectin benzoate 5 SG and bifenthrin 10 EC were recorded 0.30, 0.40 and 0.46 larvae per plant, respectively and were found to be superior over rest of the treatments. Significantly maximum larval population (3.06/plant) was recorded in untreated control.

Among the different insecticides which were evaluated for its efficacy, chlorantraniliprole 20 SC recorded highest per cent reduction over untreated control (79.6%) which was on par with spinosad 45 SC (73.2 %) (Table 1). The next best treatments which recorded

higher larval reduction were lamdacyhalothrin 5 EC (71.6 %) and emamectin benzoate 5 SG (66.8 %) and bifenthrin 10EC (62.4 %) and these were found superior over rest of the treatments. However, azadiractin 1500 ppm @ 3ml/l and imidachloprid 76 FS @ 7.5 g were in effective by also recording 30.4 and 40 per cent larval reduction respectively.

Among the various treatments, chlorantraniliprole 20 SC recorded significantly minimum capsule damage (2.93 %) which was on par with spinosad 45 SC (3.30 %), lamdacyhalothrin 5 EC (3.46%) and emamectin benzoate 5 SG (3.53 %) and found significantly superior over rest of the treatments (Fig 1). Significantly maximum capsule damage (6.33 %) was recorded in untreated control (Table 2).

Table.1 Evaluation of insecticides on larval population of sesame capsule borer, *Antigastra catalaunalis*

Sl. No.	Treatment	Dosage ml or g/l	Number of larvae per plant					Mean	Per cent reduction over untreated
			First spray			Second spray			
			1 DBS	3 DAS	10 DAS	3 DAS	10 DAS		
1	Seed Treatment With Imidacloprid 60 FS	7.50	2.03 (1.59)	1.96 (1.57)^{fg}	1.76 (1.50)^{d}	1.76 (1.50)^{e}	1.76 (1.50)^{d}	1.85	40.00
2	Spinosad 45 SC	0.12	2.00 (1.58)	0.46 (0.98)^{ab}	0.40 (0.94)^{ab}	0.36 (0.93)^{ab}	0.16 (0.81)^{ab}	0.67	73.20
3	Chlorantraniliprole 20 SC	0.20	1.96 (1.57)	0.28 (0.88)^{a}	0.15 (0.80)^{a}	0.13 (0.79)^{a}	0.03 (0.73)^{a}	0.51	79.60
4	Emamectin Benzoate 5 SG	0.20	2.03 (1.59)	0.66 (1.07)^{bd}	0.55 (1.01)^{ab}	0.53 (1.05)^{bcd}	0.40 (0.96)^{bc}	0.83	66.80
5	Profenophos 50 EC + Nuvan 76 EC	2.00 + 0.50	2.06 (1.58)	0.86 (1.16)^{de}	0.76 (1.12)^{bc}	0.70 (1.09)^{cd}	0.53 (1.01)^{c}	0.98	60.80
6	Prophenophos 50 EC	2.00	2.00 (1.58)	1.10 (1.26)^{e}	1.06 (1.24)$_{c}$	0.83 (1.15)^{b}	0.63 (1.06)^{c}	1.12	55.20
7	Bifenthrin 10 EC	0.50	2.00 (1.58)	0.80 (1.13)^{cde}	0.76 (1.12)^{bc}	0.70 (1.09)^{cd}	0.46 (0.98)^{bc}	0.94	62.40
8	Azadirachtin 1500 ppm	3.00	2.06 (1.60)	1.78 (1.51)^{f}	1.75 (1.50)d	1.69 (1.48)^{e}	1.46 (1.40)^{d}	1.74	30.40
9	Lamdacyhalothrin 5 EC	0.50	1.90 (1.56)	(0.53) (1.01)^{abc}	0.40 (0.94)^{ab}	0.43 (0.96)^{abc}	0.30 (0.88)^{abc}	0.71	71.60
10	Control		2.16 (1.63)	2.36 (1.63)^{g}	2.6 (1.75)^{e}	2.76 (1.77)^{f}	3.01 (1.97)^{e}	2.50	0.00
	S.Em±			**0.05**	**0.052**	**0.045**	**0.041**		
	CD @ 5%		**NS**	**0.17**	**0.16**	**0.13**	**0.12**		

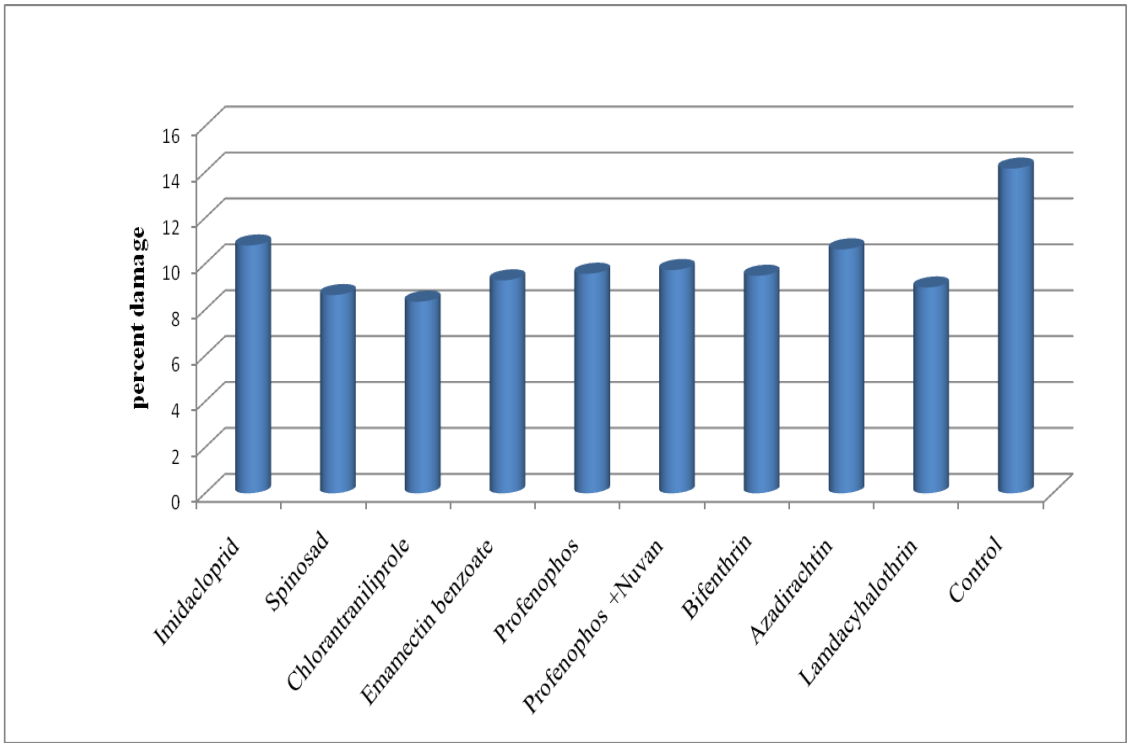
DBS – Day before spraying; DAS – Days after spraying; NS – Non significant;
Figures in the parenthesis are √x+0.5 transformed values.
Means followed by the same alphabet in the Column do not differ significantly by DMRT

Table.2 Evaluation of insecticides on capsule damage by sesame capsule borer, *Antigastra catalaunalis* and seed yield

Sl. No.	Treatment	Dosage ml or g/ lit	Per cent capsule damage	Seed yield (q/ ha)
1	Seed treatment with Imidacloprid 60 FS	7.50	4.90 (13.07)	4.07
2	Spinosad 45 SC	0.12	3.30 (10.97)	5.35
3	Chlorantraniliprole 20 SC	0.20	2.93 (9.19)	5.72
4	Emamectin Benzoate 5 % SG	0.20	3.53 (10.95)	5.13
5	Profenophos 50 EC + Nuvan 76 EC	2.00+0.50	3.90 (11.10)	4.55
6	Profenophos 50 EC	2.00	4.00 (11.27)	4.38
7	Bifenthrin 10 EC	0.50	3.86 (10.95)	5.01
8	Azadirachtin 1500 ppm	3.00	4.50 (11.89)	4.18
9	Lamdacyhalothrin 5 EC	0.50	3.46 (10.13)	5.22
10	Control		6.33 (14.43)	3.91
	S.Em±		**0.90**	**0.36**
	CD @ 5%		**1.52**	**0.65**
	CV (%)		**11.16**	**13.79**

*Figures in the parentheses are arcsine transformed values.

Fig.1 Evaluation of insecticides against per cent damage of sesame capsule borer



The mean of observation taken at different time intervals revealed that among various insecticides evaluated chlorantraniliprole 20 SC @ 0.2 ml recorded significantly least larval population (0.51 larva/plant) of capsule borer which was on par with spinosad 45 SC @ 0.12 ml, lamdacyhalothrin 5 EC @ 0.5ml and emamectin benzoate 5 SG @ 0.2g. The commercial formulation neem 1500 PPM and imdacloprid 76 FS recorded higher larvae of 1.74 and 1.85 larva per plant respectively. These results are in agreement with Sasikumar and Kumar (2014) who reported that the treatment with lambda cyhalothrin 5 EC @ 25 g a.i./ha, the per cent larval mortality was high followed by spinosad 45 SC @ 33.75 g a.i./ha, *B. thuringiensis* var. *kurstaki* @ 50 g a.i./ha compared to the other treatments including Azadirachtin. Similarly, Varma *et al.*, (2013) reported that emamectin benzoate 0.001 per cent recorded lowest flower damage against capsule borer on sesame. Afzal *et al.*, (2002) reported that the reduction in pest population was the greatest in the treatment with karate 2.5 EC (96%) followed by sevin 10 SP (85%). The results are in line with Karuppaiah (2014) reported that two sprays of quinalphos 0.05% at 30 and 45 days after sowing control the pest effectively.

Among different insecticides tested, Significantly higher grain yield of was recorded in chlorantraniliprole 20 SC @ 0.2 ml/l, spinosad 45 SC @ 0.12 ml/l and lamdacyhalothrin 5 EC were recorded highest grain yield of 5.72, 5.35 and 5.22 q/ha, respectively. The next best treatment was emamectin benzoate 5 SG @ 0.2 g/l which recorded 5.13 q/ha seed yield which was on par with bifenthrin 10 EC @ 0.5 ml (5.01 q/ha). Azadiractin 1500 PPM @ 3 ml/l and seed treatment with Imidacloprid 70 FS recorded grain yield of 4.18 and 4.07 q/ha,

respectively which were significantly inferior to all other treatments. The untreated control recorded lowest grain yield of 3.91 q/ ha (Table 2).

In conclusion, the application of Chlorantraniliprole 20 SC @ 0.2ml and Spinosad 45 SC @ 0.12ml was found effective against the capsule borer which recorded least incidence of capsule borer, *Antigastra catalaunalis* and highest yield.

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