

LARVICIDAL TOXICITY OF NEWER INSECTICIDES AGAINST *Spodoptera litura* Fabricius ON CAULIFLOWER

CHAUDHARY A. M .; RABARI, P. H.*; CHAUDHARI, S. J. AND DODIA, D. A.

DEPARTMENT OF ENTOMOLOGY,
C. P. COLLEGE OF AGRICULTURE,
S. D. AGRICULTURAL UNIVERSITY,
SARDARKARUSHINAGAR- 385506, GUJARAT

* E.mail : prakashento585@gmail.com

ABSTRACT

A laboratory trial was conducted to determine the relative toxicity of newer insecticides against larva of on cauliflower. The bio-efficacy of newer insecticides against larva of *S. litura* revealed that the higher larval mortality by topical application was recorded in the treatment with 5 SG @ 0.025, which gave the maximum 86.67 per cent mortality and it remained at par with spinosad @ 0.025 per cent (80.00%) and both were significantly superior over rest of the treatments.

KEY WORDS: *Spodoptera litura*, Emamectin benzoate, Bio-efficacy

INTRODUCTION

Cauliflower (*Brassica oleracea* var. *botrytis*) belongs to the genus Brassicae to family Cruciferae. The edible part of cauliflower is known as curd, which consists of a shoot system with short internodes, branches apices and bracts. The cauliflower crop is having infestation of multiple insect pest complex and constitute one of the major limiting factors in crop production by causing appreciable damage. The insect pests have been reported to attack cauliflower crop in India like as, Diamond back moth (*Plutella xylostella* L.), Cabbage butterfly (*Pieris brassicae* L.), Cabbage aphid (*Brevicoryne brassicae* L.), Cabbage borer (*Hellula undalis* Fabricius), Leaf eating caterpillar (*Spodoptera litura* Fabricius), Cabbage semilooper (*Plusia orichalcea* Fabricius), Leaf webber (*Crociodomia binotalis* Zeller), Painted bug (*Bagrada hilaris* Kirkaldy), Flea beetle

(*Phyllotreta cruciferae* Goeze). Among these, *Spodoptera litura* Fabricius is an important lepidopterous, noctuid, polyphagous and multivoltine pest. Many countries including India are undergone various research activities for its control, otherwise the spoilage of crop plants will more (Divya, 2016). In recent years the problem of resistance to chemical has worsened, resulted in 20-30 per cent crop loss due to pests in India (Vinod, K. and Singh, N. P., 2009). *S. litura* has been reported to show higher level of resistance against many of the insecticides used in the country, owing to the excessive reliance on chemical insecticides which also kill its natural enemies (Ramkrishnan *et al.*, 1984). The present investigation was undertaken on larvicidal toxicity of newer insecticides against *S. litura* on cauliflower in laboratory condition.

MATERIALS AND METHODS

A laboratory trial was conducted at Department of Entomology, C. P. College Agriculture, S. D. Agricultural University, Sardarkrushinagar to evaluate the efficacy of newer insecticides against *S. litura* on cauliflower. Total ten treatments were replicated thrice in Completely Randomized Design.

Topical application:

For this purpose, fresh cauliflower leaves were collected from the unsprayed plots and were washed thoroughly with distilled water. Such leaves were placed individually in Petri dish (9.0 x 1.0 cm). Laboratory reared larvae of *S. litura* were used as test insect. Ten larvae of *S. litura* were placed carefully on cauliflower leaf. Commercially available formulations of test insecticides were sprayed with the help of atomizer on larvae in laboratory. Untreated control was kept as one treatment. Such cauliflower leaves along with treated larvae were kept open in Petri dish for 30 minutes under ceiling fan and then covered Petri dish was kept at room temperature.

Observations recorded:

Larval mortality was recorded at 24, 48 and 72 hours after treatment. The mortality data thus obtained were corrected with respect to control mortality and statistically analysed applying Abbott's formula (Abbott, 1925).

$$P = \frac{P_1 - C}{100 - C} \times 100$$

Where,

P = Corrected mortality (%)

P_1 = Observed mortality (%) of test insect in insecticidal treatments.

C = Observed mortality (%) in control treatment.

RESULTS AND DISCUSSION

Topical application

The results revealed that all the chemical treatments found significantly

superior in per cent mortality after 24 hours of the treatments, as against biorational pesticides. The per cent mortality ranged from 6.67 to 70.00. The treatment with emamectin benzoate 5 SG @ 0.025 per cent gave the maximum of 70.00 per cent mortality and it was the best treatment and remained significantly superior over rest of the treatments, however it was at par with spinosad 45 SC @ 0.025 per cent (60.00 %) and indoxacarb 14.5 SC 0.007 per cent (49.13 %). The next effective group of treatments was profenophos 40% + cypermethrin 4% @ 0.017 per cent (53.33 %) and Chlorantraniliprole 18.5 SC @ 0.006 per cent (53.33 %) and both were found to be at par with spinosad 45 SC (60.00 %) and indoxacarb 14.5 SC (49.13 %) in efficacy. Among rest of the treatments the per cent larval mortality was negligible among which, *Bacillus thuringiensis* 5×10⁷ spores/mg @ 0.2 per cent showed 13.33 per cent mortality and remained at par with SNPV @ 250 LE/ha (6.67 %), *Beauveria bassiana* 2 × 10⁸ cfu/gm @ 0.4 per cent (6.67 %) and neem oil @ 0.5 per cent (6.67 %). The biorational pesticides were found less effective as compared to chemical pesticides.

At 48 hours of the treatment per cent mortality ranged from 13.33 to 80.00. The treatment with emamectin benzoate 5 SG @ 0.025 per cent gave the maximum of 80.00 per cent mortality and it was the best treatment over rest of the treatments and it remained at par with spinosad 45 SC @ 0.025 per cent (70.00 %) and Chlorantraniliprole 18.5 SC @ 0.006 per cent (66.67 %). The next effective treatment was profenophos 40% + cypermethrin 4% @ 0.017 per cent (56.67 %) and it remained at par with spinosad 45 SC @ 0.025 per cent, Chlorantraniliprole 18.5 SC @ 0.006 per cent and indoxacarb 14.5 SC @ 0.007 per cent (63.33 %). Among rest of the treatments the larval mortality in SNPV @

250 LE/ha was 20.00 per cent, which remained at par with *Bacillus thuringiensis* 5×10^7 spores/mg @ 0.2 per cent (16.67 %), *Beauveria bassiana* 2×10^8 cfu/gm @ 0.4 per cent (16.67 %) and neem oil @ 0.5 per cent (13.33 %). The biorational pesticides were found less effective as compared to chemical pesticides.

At 72 hours of the treatment per cent mortality ranged from 20.00 to 86.67. The maximum larval mortality was observed in emamectin benzoate 5 SG @ 0.025 per cent (86.67 %) and it was found to be the best treatment, but it remained at par with spinosad 45 SC @ 0.025 per cent (80.00 %) and both were significantly superior over rest of the treatments. The next effective group of treatments was spinosad 45 SC @ 0.025 per cent and it remained at par with Chlorantraniliprole 18.5 SC @ 0.006 per cent (73.33 %), however Chlorantraniliprole 18.5 SC @ 0.006 per cent remained at par with indoxacarb 14.5 SC @ 0.007 per cent (66.67 %) in larval mortality and found significantly superior over rest of the treatments. Treatment with indoxacarb 14.5 SC @ 0.007 per cent found at par with profenophos 40% + cypermethrin 4% EC @ 0.017 per cent (60.00 %). All the biorational pesticides remained at par with each other in efficacy, the larval mortality in *Bacillus thuringiensis* 5×10^7 spores/mg @ 0.2 per cent was 26.67 per cent followed by *Beauveria bassiana* 2×10^8 cfu/gm @ 0.4 per cent (26.67 %), SNPV @ 250 LE/ha (23.33 %) and neem oil @ 0.3 per cent (20.00 %). Thus the biorational pesticides registered less effectiveness as compared to chemical pesticides.

The above results are in close accordance with report of Rabari (2015), that emamectin benzoate was the most toxic against the *S. litura* followed by spinosad, Chlorantraniliprole and indoxacarb. Similarly Prasad *et al.* (2007) also described that emamectin benzoate was the most toxic

against the *S. litura* followed by novaluron and indoxacarb. According to Sharma and Pathania (2017) reported that larvae of *S. litura* were highly susceptible to emamectin benzoate and spinosad when, tested by topical application methods. The above reports are strongly in support of the present findings.

CONCLUSION

The higher mortality by topical application was recorded in treatment with emamectin benzoate @ 0.025 per cent gave the maximum (86.67 %) larval mortality and it was remained at par with spinosad @ 0.025 per cent (80.00%) and both were significantly superior over rest of the treatments. Thus, it can be concluded that, emamectin benzoate 5 SG was the best treatment over rest of the treatments and it gave maximum larval mortality under laboratory conditions by topical application even after 72 hrs of treatments. Looking to the safety point of view biorational pesticides exhibited lower mortality as against chemical pesticides. It can be utilized as an alternate to the chemicals in vegetable crops.

REFERENCES

- Abbott W. S. (1925). A method of computing the effectiveness of an insecticide. *J. Econ. Ent.*, 18, 265-267.
- Divya, D. (2016). Management of *Spodoptera litura*. *Imperial Journal of Interdisciplinary Research*. 2 (5) : 285-289.
- Prasad, K. D.; Madhumathi, T.; Rao, P.A. and Rao, V.S. (2007). Toxicity of insecticides to resistant strain of *Spodoptera litura* (F.) on cotton. *Annals of Plant Protection Sciences*. 15(1): 77-82.
- Rabari, P. H. (2015). Biology and management of *Spodoptera litura* Fabricious on cabbage M. Sc. (Agri.) thesis (Unpublished), C. P. College

of Agriculture, S. D. Agricultural University, Sardarkrushinagar.
 Sharma, P. C. and Pathania, A. K. (2012). *J. Insect Sci.*, (Ludhiana), 25(4): 356-329.
 Vinod, K.andSingh, N.P. (2009). Remove from marked Records *Spodoptera*

litura nuclear polyhedrosis virus (NPV-S) as a component in IPM of against (*Spodoptera litura* (F.) on cabbage. *Journal of Biopesticides*. 2(1): 84-86.

Table 1 : Larvicidal toxicity of various insecticides against *S. litura* under laboratory conditions by topical application

Sr. No.	Treatments	Concentration (%)	Per cent mortality after treatment at indicated period		
			24 hours	48 hours	72 hours
1.	Profenophos 40% + Cypermethrin 4%	0.017	47.21 ^{*b} (53.33)	48.85 ^b (56.67)	50.85 ^d (60.00)
2.	Indoxacarb 14.5 SC	0.007	49.13 ^{ab} (56.67)	52.78 ^b (63.33)	54.78 ^{cd} (66.67)
3.	Spinosad 45 SC	0.025	51.14 ^{ab} (60.00)	57.00 ^{ab} (70.00)	63.43 ^{ab} (80.00)
4.	Emamectin benzoate 5 SG	0.025	57.07 ^a (70.00)	63.93 ^a (80.00)	68.86 ^a (86.67)
5.	Chlorantraniliprole 18.5 SC	0.006	47.21 ^b (53.33)	54.78 ^{ab} (66.67)	59.00 ^{bc} (73.33)
6.	<i>Bacillus thuringiensis</i> 5×10 ⁷ spores/mg	0.2	21.43 ^c (13.33)	23.86 ^c (16.67)	31.00 ^e (26.67)
7.	SNPV @ 250 LE/ha	-	12.57 ^d (6.67)	26.07 ^c (20.00)	28.78 ^e (23.33)
8.	<i>Beauveria bassiana</i> 2 × 10 ⁸ cfu/gm	0.4	12.57 ^d (6.67)	23.86 ^c (16.67)	30.79 ^e (26.67)
9.	Neem oil	0.3	12.57 ^d (6.67)	21.14 ^c (13.33)	26.57 ^e (20.00)
S.E.m. ±			2.52	2.97	2.15
C.D. at 5 %			7.47	8.81	6.39
C. V. %			14.00	13.81	9.01

* Arc sin transformed value,

Figures in the paranthesis are retransformed value.

Treatment mean values with the letter(s) in common are not significant by Duncan's New Multiple Range test at 5 per cent level of significance

[MS received : September 24 , 2018]

[MS accepted : September 29, 2018]