The Pharma Innovation Journal 2022; SP-11(5): 830-832

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(5): 830-832

www.thepharmajournal.com
Received: 02-02-2022
Accepted: 06-04-2022

Sushila Choudhary
Department of Entomology, SKN College of Agriculture, Jobner, SKNAU, Jobner, Rajasthan, India

Suman Choudhary
Department of Entomology, SKN College of Agriculture, Jobner, SKNAU, Jobner, Rajasthan, India

Manisha Sharma
Department of Entomology, SKN College of Agriculture, Jobner, SKNAU, Jobner, Rajasthan, India

KC Kumawat
Department of Entomology, SKN College of Agriculture, Jobner, SKNAU, Jobner, Rajasthan, India

Pooja Sharma
Department of Entomology, SKN College of Agriculture, Jobner, SKNAU, Jobner, Rajasthan, India

Bhawani Singh Meena
Department of Entomology, SKN College of Agriculture, Jobner, SKNAU, Jobner, Rajasthan, India

Corresponding Author
Sushila Choudhary
Department of Entomology, SKN College of Agriculture, Jobner, SKNAU, Jobner, Rajasthan, India

Adverse effect of novel insecticide molecules against natural enemies of insect pests of Indian bean, *L. purpureus*

Sushila Choudhary, Suman Choudhary, Manisha Sharma, KC Kumawat, Pooja Sharma and Bhawani Singh Meena

Abstract
The emamectin benzoate 5 SG, pyridalyl 10 EC were observed to inflict least adverse effect on ladybird beetle, *Coccinella septempunctata* L., *vis-à-vis* maximum adverse effect was registered in dimethoate 30 EC and bifenthrin 10 EC. None of the insecticidal treatments tested under present investigation produced any phytotoxic symptoms on the Indian bean crop.

Keywords: Adverse, insecticide, molecules, enemies, *L. purpureus*

Introduction
Indian bean, *Lablab purpureus* (Linn.) Sweet commonly known as hyacinth bean, Egyptian bean, dolichos bean or *sem* (Family: Fabaceae) is one of the most ancient crops among cultivated plants.In India, *L. purpureus* as a field crop is mostly confined to the peninsular region and cultivated to a large extent in Karnataka and adjoining districts of Tamil Nadu, Andhra Pradesh and Maharashtra. Karnataka contributes a major share accounting for nearly 90 per cent in terms of both area and production in the country. Outside India, the crop is cultivated in East Africa with similar uses and in Australia as a fodder crop. Beans occupies an area of 0.230 million hectares with the production of 2.278 million tons of pods in India. In Rajasthan, beans (all types) are grown approximately in 0.75 thousand hectare area with an annual production of 1.00 thousand metric ton pods and productivity of 1.33 metric ton (Anonymous, 2017) [1].

Materials and Methods
Layout of experiment
The layout of the experiment was same as that of evaluation of bio-efficacy of novel insecticide treatments (*Vide supra* 3.2.1.1).

Method of observation
The effect on natural enemies was determined by counting the number of the same on each five tagged plants per plot one day before and 1,3, 7,10 and 15 days after both sprays by direct visual count.

Interpretation of data
The data recorded were transformed using √X+0.5 formula and subjected to statistical analysis (analysis of variance).

Phytotoxic effect of novel insecticides on Indian bean
1. **Layout of experiment**
   The layout of the experiment was same as that of evaluation of bio-efficacy of novel insecticide treatments (*Vide supra* 3.2.1.1).

2. **Method of observation**

The phytotoxicity symptoms like chlorosis, yellowing, necrosis, vein clearing, wilting, scorching, hyponasty, leaf injury, stunting and epinasty, white blotch and bronzing was proposed to be recorded from five randomly selected and tagged plants.

The plants were observed based on the visual rating scale; three, seven and fifteen days after spraying the insecticides.

Table 1: Phytotoxicity scale

Score	Phytotoxicity (%)
0	No Phytotoxicity
1	1 -10
2	10 -20
3	20 – 30
4	30 – 40
5	40 – 50
6	50 – 60
7	60 – 70
8	70- 80
9	80 – 90
10	90 – 100

Results and Discussion

In the present investigation the toxicity of insecticides was assessed on the basis of population of natural enemy. Since, the ladybird beetle, *Coccinella septempunctata* L. has been recorded as the major natural enemy in Indian bean ecosystem, the observations on adverse effect of insecticides were recorded on the same. The data on adverse effect of novel insecticides on the population of *C. septempunctata* revealed that all the insecticides were found more or less toxic upto seven days of treatment. The treatment of dimethoate 0.03 per cent and bifenthrin 0.016 per cent were observed highly toxic (2.00-2.33 *C. septempunctata*/ 5 plants) and formed a non-significant group after one day of application of first insecticidal application. The maximum population was observed in emamectin benzoate 5 SG, pyridalyl 10 EC and vertimec 1.9 EC (4.33-4.67 *C. septempunctata*/ 5 plants) which were found at par and formed a non-significant group after one of first insecticidal application. The other treatments (buprofezin 25 SC 0.04 per cent, pyriproxyfen 10.8 EC 0.005 per cent, chlorantraniliprole 18.5 SC 0.005 per cent, flubendiamide 39.35 EC 0.01 per cent, chlorfenapyr 10 SC 0.01 per cent, diafenthiuron 50 WP 0.05 per cent and pymetrozine 50 WG 0.025) resulted in the middle order. After fifteen days of treatment, all insecticides were found at par with the untreated control except dimethoate 30 EC. Same trend of adverse effect of different novel insecticides was evident in the second application.

Balakrishnan *et al.* (2009) [2] pointed out that bifenthrin spray reduced the natural enemy population and differed over that of untreated control. The results got support by the findings of Sattar *et al*. (2018) who reported that dimethoate, bifenthrin and pypriproxyfen were harmful to C. *septempunctata*. The present findings are in line of the work carried out by Varghese and Mathew (2013) [6] who pointed out that organophosphate dimethoate 30 EC was found to be unsafe to natural enemies. Based on overall results, the treatment of pyriproxyfen (0.005%), buprofezin (0.04), chlorantarniliprole (0.005%), flubendiamide (0.01%), chlorfenapyr (0.01%), diafenthiuron (0.05%), vertimec (9.5mg a.i./l), pymetrozine (0.025%) were observed moderately harmful/ adverse against the natural enemies. Cabral *et al.* (2018) found buprofezin as comparatively safer to *Coccinella undecimpunctata*. These results were corroborated with the findings of sharma *et al.* (2017) who reported these insecticides as moderately toxic to natural enemies. The treatment of emamechtin benzoate (0.005%) and pyridalyl (0.015%) were observed least toxic to natural enemies. These findings are in agreement with that of Sharma *et al*. (2017) [5] who reported that pyridalyl as relatively safer for natural enemies.

The descending order of harmfulness of different insecticides to ladybird beetle, *C. septempunctata* population was found to be: dimethoate 30 EC 0.03 per cent, bifenthrin 10 EC 0.016 per cent, buprofezin 25 SC 0.04 per cent, pyriproxyfen 10.8 EC 0.005 per cent, chlorantraniliprole 18.5 SC 0.005 per cent, flubendiamide 39.35 EC 0.01 per cent, chlorfenapyr 10 SC 0.01 per cent, diafenthiuron 50 WP 0.05 per cent, vertimec 1.9 EC 9.5 mg/l, pymetrozine 50 WG 0.025 per cent, pyridalyl 10 EC 0.015 per cent and emamectin benzoate 5 SG 0.005 per cent.

Table 2: Adverse effect of novel insecticide molecules on population of ladybird beetle, *Coccinella septempunctata* L. (First spray)

S. No.	Insecticides	Concentration (%)	Pre- treatment count	Population days after spray					
				One	Three	Seven	Ten	Fifteen	Mean
1.	Buprofezin 25 SC	0.04	6.00 (2.55)	2.67 (1.78)	3.00 (1.87)	3.67 (2.04)	4.33 (2.20)	6.67 (2.68)	4.07
2.	Pyriproxyfen 10.8 EC	0.005	6.00 (2.55)	2.67 (1.78)	3.00 (1.87)	3.67 (2.04)	4.33 (2.20)	6.67 (2.68)	4.07
3.	Diafenthiuron 50 WP	0.05	6.00 (2.55)	3.67 (2.04)	4.33 (2.20)	4.00 (2.12)	4.67 (2.27)	7.00 (2.74)	4.73
4.	Vertimec 1.9 EC	9.5 mg $a.i.l^{-1}$	6.33 (2.61)	4.33 (2.20)	4.67 (2.27)	5.33 (2.41)	6.33 (2.61)	7.00 (2.74)	5.53
5.	Chlorantraniliprole 18.5 SC	0.005	6.33 (2.61)	2.67 (1.78)	3.67 (2.04)	3.33 (1.96)	4.67 (2.27)	6.67 (2.68)	4.20
6.	Chlorfenapyr 10 SC	0.01	6.33 (2.61)	3.33 (1.96)	4.00 (2.12)	3.67 (2.04)	4.67 (2.27)	7.00 (2.74)	4.53
7.	Emamectin benzoate 5 SG	0.005	6.67 (2.68)	4.67 (2.27)	6.00 (2.55)	6.33 (2.61)	6.67 (2.68)	7.00 (2.74)	6.13
8.	Flubendiamide 39.35 EC	0.01	6.33 (2.61)	3.33 (1.96)	3.67 (2.04)	3.33 (1.96)	4.67 (2.27)	7.00 (2.74)	4.40
9.	Pymetrozine 50 WG	0.025	6.67 (2.68)	3.67 (2.04)	5.67 (2.48)	5.67 (2.48)	6.67 (2.68)	7.00 (2.74)	5.74
10.	Pyridalyl 10 EC	0.015	6.67 (2.68)	4.67 (2.27)	5.67 (2.48)	6.00 (2.55)	6.67 (2.68)	7.33 (2.80)	6.07
11.	Bifenthrin 10 EC	0.016	6.00 (2.55)	2.33 (1.68)	2.67 (1.78)	2.67 (1.78)	3.67 (2.04)	6.67 (2.68)	3.60
12.	Dimethoate 30 EC (Check)	0.03	6.00	2.00	2.33	2.67	3.00	6.33	3.27
			(2.55)	(1.58)	(1.68)	(1.78)	(1.87)	(2.55)	
13.	Control	-	6.67 (2.68)	6.00 (2.55)	7.33 (2.80)	7.67 (2.84)	7.00 (2.74)	7.33 (2.80)	7.07
	S.Em +		0.07	0.05	0.06	0.06	0.06	0.07	
	CD (p=0.05)		NS	0.15	0.16	0.17	0.18	0.21	

Figures in the parenthesis are $\sqrt{X} + 0.5$ values

Table 3: Adverse effect of novel insecticide molecules on population of ladybird beetle, *Coccinella septempunctata* L. (Second spray)

S. No.	Insecticides	Concentration (%)	Pre- treatment count	Population days after spray					
				One	Three	Seven	Ten	Fifteen	Mean
1.	Buprofezin 25 SC	0.04	6.00 (2.55)	3.33 (1.96)	2.33 (1.68)	3.00 (1.87)	4.00 (2.12)	6.67 (2.68)	3.87
2.	Pyriproxyfen 10.8 EC	0.005	6.67 (2.68)	3.67 (2.04)	2.33 (1.68)	3.00 (1.87)	4.00 (2.12)	6.67 (2.68)	3.93
3.	Diafenthiuron 50 WP	0.05	6.00 (2.55)	3.67 (2.04)	4.00 (2.12)	3.67 (2.04)	4.67 (2.27)	7.00 (2.74)	4.60
4.	Vertimec 1.9 EC	9.5 mg a.i.l-1	6.33 (2.61)	4.00 (2.12)	5.00 (2.35)	5.00 (2.35)	6.00 (2.55)	7.00 (2.74)	5.40
5.	Chlorantraniliprole 18.5 SC	0.005	6.67 (2.68)	3.33 (1.96)	2.33 (1.68)	3.33 (1.96)	4.00 (2.12)	6.67 (2.68)	3.93
6.	Chlorfenapyr 10 SC	0.01	6.33 (2.61)	3.67 (2.04)	4.00 (2.12)	3.33 (1.96)	4.33 (2.20)	6.67 (2.68)	4.40
7.	Emamectin benzoate 5 SG	0.005	6.67 (2.68)	4.67 (2.27)	5.67 (2.48)	6.33 (2.61)	6.33 (2.61)	7.33 (2.80)	6.07
8.	Flubendiamide 39.35 EC	0.01	6.33 (2.61)	3.00 (1.87)	3.67 (2.04)	3.33 (1.96)	4.33 (2.20)	6.67 (2.68)	4.20
9.	Pymetrozine 50 WG	0.025	6.67 (2.68)	4.33 (2.20)	5.33 (2.41)	5.33 (2.41)	6.00 (2.55)	7.00 (2.74)	5.60
10.	Pyridalyl 10 EC	0.015	6.67 (2.68)	4.33 (2.20)	5.33 (2.41)	5.67 (2.48)	6.00 (2.55)	7.00 (2.74)	5.67
11.	Bifenthrin 10 EC	0.016	6.33 (2.61)	3.00 (1.87)	2.00 (1.58)	2.33 (1.68)	3.00 (1.87)	7.33 (2.68)	3.53
12.	Dimethoate 30 EC (Check)	0.03	6.00 (2.55)	2.67 (1.78)	1.67 (1.35)	2.00 (1.58)	2.67 (1.78)	2.80 (2.55)	2.36
13.	Control	-	6.67 (2.68)	6.33 (2.68)	6.67 (2.68)	7.00 (2.74)	6.67 (2.68)	7.00 (2.74)	6.73
	S.Em. +		0.07	0.05	0.05	0.06	0.06	0.07	
	CD (p=0.05)		NS	0.16	0.15	0.16	0.17	0.20	

Figures in the parenthesis are $\sqrt{X + 0.5}$ values

References

1. Anonymous. Horticulture Statistics at a Glance. Department of Agriculture and Corporation, New Delhi, 2017, 143-194.
2. Balakrishnan N, Kumar BV, Sivasubramanian P. Bioefficacy of bifenthrin 10 EC against sucking insects, bollworms and natural enemies in cotton. Madras Agricultural Journal. 2009;96:225-229.
3. Cabral S, Garcia P, Soares AO. Effects of pirimicarb, buprofezin and pymetrozine on survival, development and reproduction of Coccinella undecimpunctata. Biocontrol Science and Technology. 2018;18:307.
4. Sattar A, Azam I, Sarwar MK, Amjad A, Malik MF. Effect of insecticides on Coccinella septempunctata. Asian Journal of Agriculture and Biology. 2018;6:125-134.
5. Sharma P, Kumawat KC, Khinchi SK, Virendra Kumar, Baddhri Prasad. Toxic effect of different insecticides on coccinellid beetle, Coccinella septempunctata in cabbage ecosystem. International Journal of Chemical Studies. 2017;5:894-896.
6. Varghese TS, Mathew TB. Bioefficacy and safety evaluation of newer insecticides and acaricides against chilli thrips and mites. Journal of Tropical Agriculture. 2013;51:111-115.