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Vishvendra

Department of Entomology,
College of Agriculture,
Sardar Vallabhbhai Patel
University of Agriculture and
Technology (SVPUAT), Meerut,
Uttar Pradesh, India

SK Sachan

Department of Entomology,
College of Agriculture,
Sardar Vallabhbhai Patel
University of Agriculture and
Technology (SVPUAT), Meerut,
Uttar Pradesh, India

Efficacy of insecticides and biorationals against major insect cabbage butterfly, *Pieris brassicae* in mustard crop

Vishvendra and SK Sachan

Abstract

Among the various treatments evaluated for their bio-efficacy against cabbage butterfly, *P. brassicae* on mustard crop during 2016-17 and 2017-18 at SVP University of Agriculture and technology, Meerut, the Spinosad 45 SC@ 200 ml treated plot followed by Novaluron10 EC@ 500ml was proved to be the best treatment with mean aphid population of 6.11 and 7.00 during 2016-17, 4.33 and 5.50 painted bug recorded from five randomly selected plant during 2017-18. The observations were recorded at 3, 7 and 10 days after spraying of insecticides. The results revealed that Spinosad 45 SC was the most effective among the nine insecticides and biorationals showing the minimum numbers of *P. brassicae* followed by Novaluron and Dimethoate.

Keywords: Biorationals, cabbage butterfly, *Pieris brassicae*, mustard crop

Introduction

Rapeseed-mustard (*Brassica* sp.) is a major group of oilseed crop of the world being grown in 53 countries across the six continents. India contributes 28.3% in world acreage and 19.8% in world production. Mustard (*Brassica juncea* Coss) is grown mainly for its seeds, which yield good quality of edible oil to the extent of 30 to 48%. In India mustard is cultivated over an area of 6.65 million hectare with production of 7.10 million tonnes of seed. The average yield of mustard in country is 1069 kg ha⁻¹ (Anonymous, 2017) [1]. In India, Rajasthan ranks 1st in both area (2.79 million hectare) and production (3.30 million tonnes) and Gujarat state has the highest productivity (1515 kg ha⁻¹) of mustard. In U.P. mustard is grown an area of 7.85 lakh hectare with production of 8.48 lakh tonnes and productivity of 1080 kg ha⁻¹ (Anonymous, 2017) [1]. Cabbage butterfly, *Pieris brassicae* is also a serious and widespread pest of crucifers and considered most obnoxious one of cabbage, cauliflower, broccoli, radish, etc, causing heavy damage in its larval stage by devouring the foliage. The butterflies is active when the sunshine and the temperature is sufficiently high, otherwise it remain under leaves or other shelter. The large caterpillar made more damage to the leaves, often leaving only the large veins.

Material and Methods

Two field experiment were laid out in randomize block design (RBD) to study the efficacy of some insecticides against painted bug, *Bagrada hilaris* on mustard crop during Rabi season, 2016-17 and 2017-18 at Crop Research Center of S. V. P. University of Agriculture and Technology, Meerut (India) with nine treatments. The crop variety Pusa bold was sown on November 20, 2016 for the first year experiment and on November 15, 2017 for the second year experiment. The distance between row to row and plant to plant was 30cm and 10cm, respectively. The recommended agronomic practices were followed. The soluble insecticides were applied after duly mixing with water (300 lit/ha and 500 lit/ha). The population of cabbage butterfly was counted as number of larvae on five randomly selected plants from each plot one day prior and 3, 7 and 10 days after insecticide application.

Result and Discussion

Effect of different treatments against cabbage butterfly, *P. brassicae* Pooled Data recorded on 3rd day after application of treatments revealed that all the treatments were found significantly superior over control and population of cabbage butterfly larvae varied from 8.25 to 27.50.

Corresponding Author:

Vishvendra

Department of Entomology,
College of Agriculture,
Sardar Vallabhbhai Patel
University of Agriculture and
Technology (SVPUAT), Meerut,
Uttar Pradesh, India

The minimum (8.25) cabbage butterfly larvae were observed in Spinosad 45SC and it was significantly superior over rest of treatments followed by Novaluron 10EC (9.08 larvae), Dimethoate 30EC (12.58 larvae), Thiamethoxam 25WDG (14.00 larvae) and Imidacloprid 17.8SL (17.25 larvae). The next in order of effectiveness were Neemarin and NSKE with 20.66 and 22.83 larvae, respectively. The maximum (27.5) number of cabbage butterfly larvae was observed in *B. bassiana* which was at par with *M. anisopliae* (25.66 larvae). Observation recorded on 7th day of first application revealed that the larvae of cabbage butterfly varied from 4.08 to 24.66. The minimum (4.08) cabbage butterfly larvae were noticed again in Spinosad 45SC and it was significantly superior over rest of treatments followed by Novaluron 10EC (5 larvae) and dimethoate (8.25 larvae). The maximum (24.66) cabbage butterfly larvae was recorded in the plot treated with *B. bassiana* followed by *M. anisopliae* (22.75 larvae) and NSKE (19.25 larvae) which differ significantly from each other. On 14th day after first application it was observed that Spinosad 45SC was most effective in the reduction of

cabbage butterfly larvae. The minimum population of cabbage butterfly larvae was recorded in Spinosad 45SC (4.08) and Novaluron 10EC (4.66 larvae) which were statistically at par and significantly superior rest of treatments. The least effective treatment was *B. bassiana* with 25.00 cabbage butterfly larvae. The order of effectiveness of treatments was Spinosad > Novaluron > Dimethoate > Thiamethoxam > Imidacloprid > Neemarin > NSKE > *M. anisopliae* > *B. bassiana*.

In the present study, Spinosad 45 SC proved most effective treatment for the control cabbage butterfly population which is closely followed by novaluron 10 EC. Earlier Singh *et al.* (2015) [2] and Khan and Kumar (2017) [3] also reported that Spinosad 45 SC was most effective in reducing the infestation of cabbage butterfly larvae. Neemarin and NSKE was found effective in the present studies, which is in agreement with the result obtained by Hasan and Ansari (2011) [3]. *B. bassiana* was least effective in present studies which are in accordance with the result of Devee and Baruah (2012) [2].

Table 1: Effect of different treatments against painted bug, *Pireis brassicae* during Rabi, 2016-2017 and 2017-18

Treatments	No of Cabbage butterflies					
	Dose/ ha	Before spray	First and Second spray pooled data of 2016-17 and 2017-18			
			3 DAS	7 DAS	14 DAS	Mean
Thiomethoxam 25 WDG	100 gm	27.67	14	9.41	10.08	11.16
Imidacloprid 17.8 SL	150 ml	26.33	17.25	14	13.91	15.05
Novaluron 10 EC	500 ml	25.67	9.08	5	4.66	6.24
Spinosad 45 SC	200 ml	28.67	8.25	4.08	4.08	5.47
NSKE	2 litre	25.33	22.83	19.25	19.66	20.58
Neemarin 1500 Ppm	3 litre	27.00	20.66	17.08	17.08	18.27
<i>Beauveria bassiana</i> 2x10 ⁹ CFU	2.5 kg	25.33	27.5	24.66	25	25.72
<i>Metarhiziumanisopliae</i> 2x10 ⁹ CFU	2.5 kg	26.67	25.66	22.75	22.5	23.63
Dimethoate 30 EC	1000 ml	27.33	12.58	8.25	9.08	9.97
Control	-	28.33	29.83	28.58	29.58	29.33
SE(m) ±	-	0.43	0.07	0.08	0.08	0.07
CD at 5%	-	N/A	0.21	0.24	0.25	0.23

Figure in parentheses are square root values

DAS = Day after spray

Summary and Conclusion

Spinosad 45SC was recorded most effective against cabbage butterfly larvae followed by Novaluron and Dimethoate. The least effective treatment recorded against cabbage butterfly was *B. bassiana* followed by *M. anisopliae* and NSKE.

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