



EFFICACY OF SOME INSECTICIDES AND BIOPESTICIDES AGAINST MUSTARD APHID *LIPAPHIS ERYSIMI* KALT.

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ABSTRACT

The mustard aphid *Lipaphis erysimi* Kalt can reduce yields up to 96%. In rabi 2017-18, a field study was conducted at the Crop Research Centre (CRC), Sardar Vallabhbhai Patel University of Agriculture and Technology, Modipuram, Meerut (Uttar Pradesh), to assess the efficacy of some insecticides and biopesticides. Thiamethoxam 25WG @ 100 g/ha was observed to be more effective with least incidence at 3, 7, and 10 days after the first and second sprays. Imidacloprid 17.8SL @ 100 ml/ha was the second-best treatment. Dimethoate 30EC @ 1000 ml/ha, fipronil 5SC @ 500 ml/ha, *Beauveria bassiana* @ 2.0 kg/ha, and *Metarhizium anisopliae* @ 2.0 kg/ha were the other treatments found effective.

Key words: *Lipaphis erysimi*, mustard, incidence, insecticides, biopesticides, thiamethoxam, dimethoate, *Beauveria bassiana*, *Metarhizium anisopliae*, yield, economics, cost benefits

Mustard (*Brassica juncea*) is an important oilseed crop (Kumar et al., 2022; Kamil et al., 2017), with production, area, and yield being 72.37 mt, 36.59 million ha, and 1980 kg/ha, respectively, during 2018-19 (Seerja and Kumar, 2022); for India, these are 6.33 mt, 6.41 million ha, and 6979 kg/ha, respectively (Taki, 2022), and it is majorly grown in northwest Madhya Pradesh (Gautam et al., 2019). Many biotic and abiotic factors are responsible for its reduced yield (Deka et al., 2017, and various diseases, insect pests, and weeds are responsible. It is affected by more than three dozen insect pests known in India (Sinha et al., 2018). Amongst these the mustard aphid, *Lipaphis erysimi* Kalt. is the key pest (Sahoo, 2012). There are various options available for its management, but insect resurgence and insecticide resistance are the serious problems. Therefore, the present study to evaluate the efficacy of certain insecticides and biopesticides, along with establishing their cost benefits.

MATERIALS AND METHODS

The insecticides were procured from the local market of Modipuram and biopesticides were procured from the Entomology department, Sardar Vallabhbhai Patel University of Agriculture and Technology, Modipuram, Meerut. The field experiment was conducted with treatments done two times during rabi, 2017-18 at the Crop Research Centre (CRC), Sardar Vallabhbhai Patel University of Agriculture and Technology, Modipuram,

Meerut (29°40'N, 77°42'E, 237 masl). Seven treatments including control were evaluated viz., T1 (Imidacloprid 17.8%SL @ 100 ml/ha), T2 (*Beauveria bassiana* @ 2 kg/ha), T3 (Thiamethoxam 25 WG @ 500-1000 g/ha), T4 (Fipronil 5 SC @ 500 ml/ha), T5 (*Metarhizium anisopliae* @ 2 kg/ha), T6 (Dimethoate 30 EC @ 1000 ml/ha) and T8 (Check) in natural field plots (plot size of each treatment: 4.2 x 3 m²) with three replications in a randomized block design. Observations were made on 10 randomly selected plants on the top 10 cm twig/plot; one day before (pretreatment), and at 3, 7, and 10 days after the first and second spray, and 10 days after the first spray was considered as pretreatment observation for the second spray. The cost benefit ratio was determined for each treatment and incremental cost benefit ratio (ICBR) worked out. Data were subjected to ANOVA after necessary transformation (Panse and Sukhatme, 1978) with OPSTAT software.

RESULTS AND DISCUSSION

The data on the efficacy of insecticides and biopesticides reveal that thiamethoxam 25WG (77.00, 34.66 and 91.66 aphids/10 plants at 3, 7 and 10 days after the first spray, respectively; and 37.33, 21.33 and 17.00 aphids/10 plants at 3, 7 and 10 days after the second spray) is the most superior (Table 1). These findings derive support from Kumar et al. (2013) with thiamethoxam 25% WDG @ 100 g/ha. Ghule and Bagde (2016) observed that 0.003% thiamethoxam as

Table 1. Efficacy of insecticides and biopesticides against *L. erysimi*

S. No.	Treatment	Dose	DBS	First spray			Second spray			Yield (q/ha)	Increase in yield over control (q/ha)	Value of increase yield (Rs./ha)	Cost of treatment (Rs./ha)	Net profit (Rs./ha)	Cost benefit ratio
				3 rd DAT	7 th DAT	10 th DAT	3 rd DAT	7 th DAT	10 th DAT						
1	Imidacloprid 17.8 SL @	100 ml	281.00 (16.78)	77.66 (8.86)	35.66 (6.04)	93.33 (9.71)	38.00 (6.24)	22.33 (4.82)	17.66 (4.31)	16.90	26625.00	2450	24175.00	1:9.86	
2	<i>Beauveria bassiana</i> @	2.0 kg	271.00 (16.48)	144.66 (12.06)	117.33 (10.87)	167.66 (12.98)	151.33 (12.34)	122.66 (11.12)	124.66 (11.21)	15.50	21375.00	2300	19075.00	1:8.29	
3	Thiamethoxam 25 WG @	100 g	281.00 (16.78)	77.00 (8.83)	34.66 (5.97)	91.66 (9.62)	37.33 (6.19)	21.33 (4.72)	17.00 (4.24)	15.75	22312.50	2010	20302.00	1:10.10	
4	Fipronil 5 SC @	500 ml	276.66 (16.65)	137.33 (11.67)	99.66 (10.03)	154.66 (12.47)	93.33 (9.71)	78.00 (8.88)	63.00 (7.99)	14.90	19215.00	2390	16825.00	1:7.03	
5	<i>Metarhizium anisopliae</i> @	2.0 kg	268.00 (16.40)	152.33 (12.38)	124.66 (11.21)	173.66 (13.21)	155.33 (12.50)	125.66 (11.25)	128.33 (11.37)	11.70	7125.00	1450	5675.00	1:3.91	
6	Dimethoate 30 EC @	1000 ml	271.66 (16.51)	96.33 (9.86)	50.00 (7.14)	107.00 (10.39)	86.33 (9.34)	72.33 (8.56)	57.66 (7.65)	12.10	8625.00	1450	7175.00	1:4.94	
7	Control		279.33 (16.74)	288.66 (16.95)	297.33 (17.18)	308.67 (17.43)	312.33 (17.54)	317.33 (17.68)	287.66 (16.93)	9.80	-	-	-	-	
	SE (M) ±		0.258	0.06	0.09	0.056	0.09	0.05	0.06						
	CD (p=0.05)		N/S	0.19	0.30	0.17	0.28	0.18	0.21						

Market price of mustard Rs. 3850/q, Sprayer rent Rs. 50/day, Labour charge Rs. 200/day and two labour for one days were used. C: B = Value of saved yield over control (Rs./ha)/total cost of protection (Rs./ha).

the best. The economics of treatments revealed that highest C: B (1:10.00) was obtained from plots treated with imidacloprid 17.8%SL @ 100 ml/ ha followed by thiamethoxam 25WG @ 100 g/ ha (1: 9.86), while the least (1:3.91) was found in *Beauveria bassiana* @ 2 kg/ ha. Mishra and Yadav (2013) obtained maximum cost: benefit ratio of 1.92 and 1.87 with imidacloprid. Thus, to reduce risk, some newer insecticides have been found more appropriate.

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CONFLICT OF INTEREST

No conflict of interest.

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