



# **Efficacy of Chemicals and Bio-pesticides against Mustard Aphid, *Lipaphis erysimi* (Kalt.) on Mustard**

**Abhay Tak <sup>a</sup>, Anoorag Rajnikant Tayde <sup>a\*</sup>  
and Akhilesh Tripathi <sup>b</sup>**

<sup>a</sup> Department of Entomology, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj – 211007, India.

<sup>b</sup> Department of Entomology, KAPG College, Prayagraj – 211007, India.

## **Authors' contributions**

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

## **Article Information**

DOI: <https://doi.org/10.9734/ijpss/2024/v36i74718>

## **Open Peer Review History:**

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/117092>

**Original Research Article**

**Received: 20/03/2024**

**Accepted: 23/05/2024**

**Published: 04/06/2024**

## **ABSTRACT**

The present investigation was conducted during *rabi* season of 2023-2024 at Crop Research farm, NAI, SHUATS, Prayagraj using Randomized Block Design (RBD) method and eight treatments are replicated thrice. Results revealed that, among all the treatments Imidacloprid 17.8 SL recorded lowest population of aphid (55.67), followed by Spinosad 45% SC (66.51), Cypermethrin 10% EC (78.55), Sixer plus (94.49), Nisco MECH 333 (96.17), Neem oil 5% (99.44), and *Beauveria bassiana* (109.90) was less effective among all the treatments. While, the highest yield and cost benefit ratio was obtained with Imidacloprid 17.8 SL (18.15 q/ha.), (1:5.20) Followed by Spinosad 45% SC (17.85 q/ha.), (1:4.78), Cypermethrin 10% EC (16.35 q/ha.), (1:4.54), Sixer plus (14.98 q/ha.), (1:4.18), Nisco MECH 333 (14.58 q/ha.), (1:4.08), Neem oil 5% (13.03 q/ha.), (1:3.61), *Beauveria bassiana* (12.55 q/ha.), (1:3.48) Least monetary return was obtained with control(9.17 q/ha.), (1:2.74).

\*Corresponding author: E-mail: [anurag.tayde@shiats.edu.in](mailto:anurag.tayde@shiats.edu.in);

Cite as: Tak, Abhay, Anoorag Rajnikant Tayde, and Akhilesh Tripathi. 2024. "Efficacy of Chemicals and Bio-Pesticides Against Mustard Aphid, *Lipaphis Erysimi* (Kalt.) on Mustard". *International Journal of Plant & Soil Science* 36 (7):170-74. <https://doi.org/10.9734/ijpss/2024/v36i74718>.

**Keywords:** Field efficacy; imidacloprid; insecticides; *Lipaphis erysimi*; mustard.

## 1. INTRODUCTION

The term "mustard" originally referred to a condiment and was derived from the Latin word "mustum". Mustard, *Brassica juncea* (L.) A significant oilseed crop in the Cruciferae (also known as the Brassicaceae) family is czerń and coss. Brown mustard or Indian mustard has chromosomal number (2n=36) [1].

"Mustard is also rich in minerals like calcium, manganese, copper, iron, selenium, zinc, and vitamins (A, B, and C), as well as proteins. In 1000 grams of mustard seeds, there are 508 kilocalories of energy, 28.09 grams of carbohydrates, 26.08 grams of proteins, 26.08 grams of total fat, and 12.2 grams of dietary fiber. Additionally, it contains 31 International Units (I.U.) of Vitamin A, 4.733 milligrams of niacin, 7.1 milligrams of Vitamin C, 266 milligrams of calcium, 9.21 milligrams of iron, 370 milligrams of magnesium, 13 milligrams of sodium, and 738 milligrams of potassium" [2]

"India ranks world's third important oil crop in terms of production and area. it is one of the three major oilseeds crops along with groundnut and soybean contributing around 25 per cent of the total oilseeds production" [3].

"*Lipaphis erysimi* belongs to the family Aphididae and is commonly known as mustard aphid. It is a cosmopolitan insect found on both the leaf surfaces and in leaf folds of developing heads, on leaf stalks, and on leaf axles. They are primarily found on the growing points of the host plants, including tips, flowers, and developing pods, and cover the whole plant with high density. They suck sap from the hosts, and infested plants become stunted and distorted" [4].

Newer insecticide molecules are a better alternative to conventional synthetic insecticides in the context of environmentally benign management tactics. They also help mitigate adverse effects on the total environment. In many cases, alternate or eco-friendly methods of insect management offer adequate levels of pest control with fewer hazards and greater safety to non-target organisms.

## 2. MATERIALS AND METHODS

The experiment was conducted at the experimental research plot of the Department of Entomology, Central Research Farm, Sam Higginbottom University of Agriculture Technology and Sciences, during the rabi season of 2023-2024. It followed a randomized block design with eight treatments replicated three times. Variety Kala Sona seeds were used in a plot size of 2m×1m at a spacing of 15cm×20cm, following a recommended package of practices excluding plant protection. The treatments included: Nisco Mech 333@ 5ml/lit., Spinosad 45% SC @0.3ml/lit., Cypermethrin 10% EC @1.2 ml/lit., Sixer plus@5ml/lit., Imidacloprid 17.8 SL @1ml/2.5lit., Neem oil 5%@ 5ml/lit., *Beauveria bassiana* 1.15WP @5gm/lit.

The observations on the population of mustard aphid were recorded visually using a magnifying lens and paper for counting the population of aphids. This was done early on the top 10cm of the central apical twig per plant from five randomly selected plants. The population of aphids was recorded in the field on the five randomly selected plants from each plot one day before spraying and on the 3rd, 7th, and 14th days after one spray of insecticides. The data was then statistically analyzed.

## 3. RESULTS AND DISCUSSION

The results (Table 1) after spray revealed that all the treatments were significantly superior over control. Among all the treatments, minimum infestation of aphid was recorded in Spinosad 45% SC (66.51) which was lower than the check treatment Imidacloprid 17.8 SL (55.67) followed by Cypermethrin 10 % EC (78.54), Sixer plus (94.49), Nisco Mech 333 (96.17), and Neem oil 5% (99.44) The least effective treatments was *Beauveria bassiana* (109.90). Maximum infestation was recorded in control (241.87).

The highest yield and cost-benefit ratio were obtained with Imidacloprid 17.8 SL (18.15 q/ha), (1:5.20), followed by Spinosad 45% SC (17.85 q/ha), (1:4.78), Cypermethrin 10% EC (16.35 q/ha), (1:4.54), Sixer Plus (14.98 q/ha), (1:4.18), Nisco MECH 333 (14.58 q/ha), (1:4.08), Neem oil 5% (13.03 q/ha), (1:3.61), *Beauveria bassiana* (12.55 q/ha), (1:3.48), and the control plot (9.17 q/ha), (1:2.74).

The data on the mean aphid population after spray in Imidacloprid 17.8 SL were (55.67) These results were supported by Dotasara *et al.*, [5] Pippal *et al.*, [6] and Raju and Tayde [7] Spinosad 45% SC was also found to be next effective (66.51). The results were also observed by Aktar *et al.*, (2021) and Sairam and Kumar [8] Cypermethrin 10% EC were (78.55). Similar findings were observed by Bhatta *et al.*, [9] and Sreeja and Kumar [10] Nisco Mech 333 was (96.17) is found to be next effective treatment which is in line with the findings of Sairam and Kumar [8].

The cost benefit ratio ranged between 1:5.20 and 1:2.74. Maximum cost benefit ratio (1:5.20) and yield (18.15 q/ha) was obtained in Imidacloprid 17.8 SL treated plots, which is supported by Saiteja and Tayde [11] and Sen and Kumar [1] and, followed by Spinosad 45 SC with cost benefit ratio (1:4.78) and yield (17.85 q/ha), and

the results were similar to the findings of Sairam and Kumar [8] Cypermethrin 10% EC also had a profitable yield of (16.35 q/ha) and cost benefit ratio (1:4.54) lined to Sreeja and Kumar [11].

From the above discussion, it was found that spraying insecticides significantly reduced the mustard aphid population on mustard. The present findings conclude that the new generation insecticides like T1 Nisco Mech 333, T2 Spinosad 45% SC, T3 Cypermethrin 10% EC, T4 Sixer Plus, T5 Imidacloprid 17.8 SL, T6 Neem oil 5%, T7 *Beauveria bassiana* 1.15WP. T4 Spinosad was found effective against *Lipaphis erysimi* along with an additional yield level in mustard, which was lower than my check treatment Imidacloprid 17.8 SL. Further, it was observed that the cost-benefit ratio was also high with Imidacloprid 17.8 SL and Spinosad 45% SC.

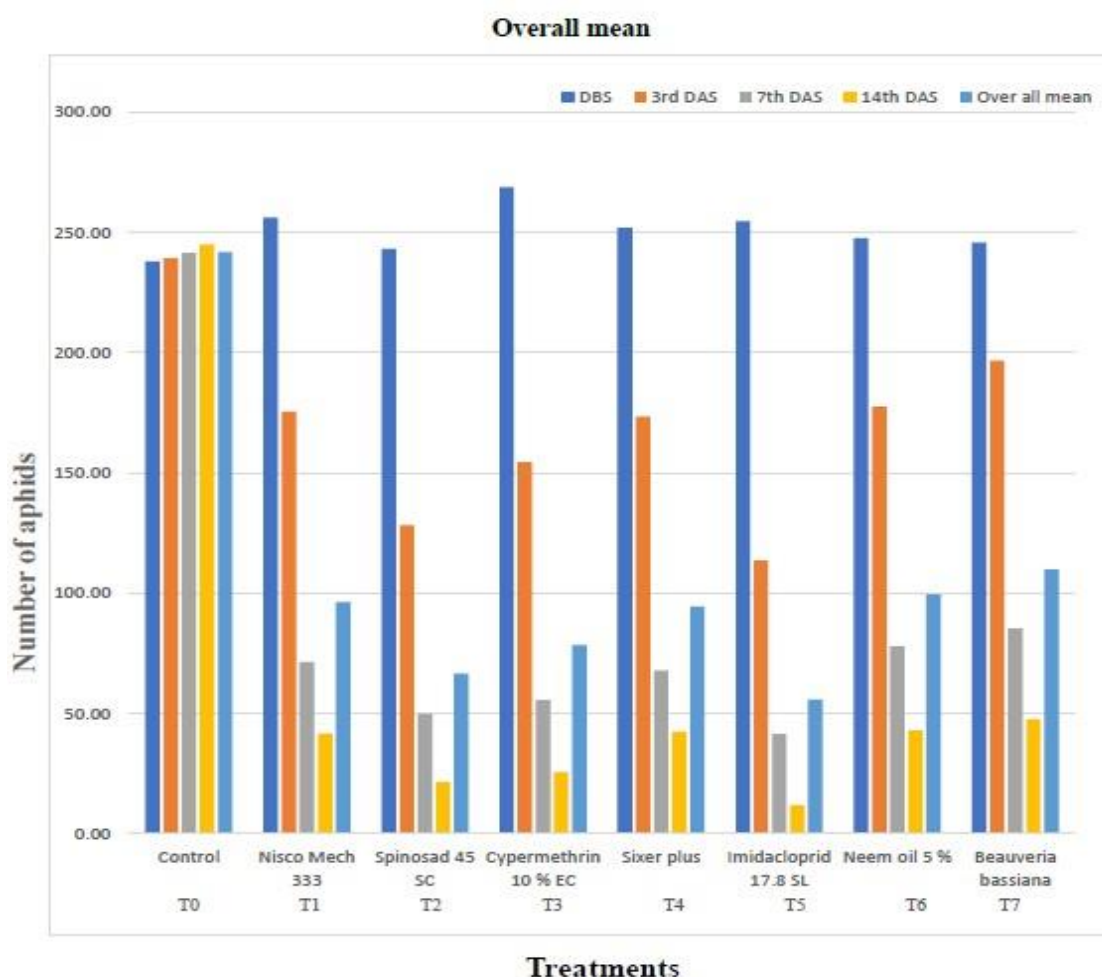


Fig. 1. Efficacy of selected chemicals and biopesticides against mustard aphid, *Lipaphis erysimi* (Kaltenbach)

**Table 1. Efficacy of selected chemicals and biopesticides on the incidence of mustard aphid, *Lipaphis erysimi* (Kaltenbach) during *rabi* Season 2023-2024 (1st spray)**

S. No.	Name of treatments	Dosages		Mean population of mustard aphid/ Top 10 cm central twig of plant				Yield (q./ha.)	Cost benefit ratio (C: B)
		(Day before spraying)		3 <sup>rd</sup> DAS	7 <sup>th</sup> DAS	14 <sup>th</sup> DAS	Mean		
T <sub>0</sub>	Control	-	238	239.2	241.33	245.07	241.87	9.17	1:2.74
T <sub>1</sub>	Nisco Mech 333	5 ml/ lit.	256.13	175.5	71.40	41.60	96.17	14.58	1:4.08
T <sub>2</sub>	Spinosad 45 % SC	0.3ml/lit.	243.13	128.2	49.87	21.47	66.51	17.85	1:4.78
T <sub>3</sub>	Cypermethrin 10% EC	1.2ml/lit	268.73	154.50	55.47	25.67	78.55	16.35	1:4.54
T <sub>4</sub>	Sixer Plus	5 ml/lit	251.87	173.40	67.73	42.33	94.49	14.98	1:4.18
T <sub>5</sub>	Imidacloprid 17.8 SL	1ml/2.5 lit	254.67	113.60	41.40	12.00	55.67	18.15	1:5.20
T <sub>6</sub>	Neem oil 5%	5 ml/lit.	247.47	177.60	77.80	42.93	99.44	13.03	1:3.61
T <sub>7</sub>	<i>Beauveria bassiana</i> 1.15WP	5gm/lit	245.73	196.7	85.80	47.67	109.90	12.55	1:3.48
<b>Overall mean</b>		-		169.83	86.35	59.84	105.32		
<b>F- test</b>		NS		S	S	S	S		
<b>SE. d (±)</b>		-		2.56	2.20	1.67	21.02		
<b>C. D. (P = 0.05)</b>		-		5.488	4.717	3.577	45.091		

DAS\*- Day After Spray NS\*- Non-Significant S\*- Significant

#### 4. CONCLUSION

Based on the finding of this study, It is suggested that effective insecticides may be alternated in harmony with the existing Integrated Pest Management programs to avoid issues associated with insecticidal resistance, pest resurgence, etc.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

#### REFERENCES

1. Sen MK, Kumar A. Comparative efficacy and economics of biopesticides and imidacloprid against mustard aphid [*Lipaphis erysimi* (Kalt.)] Hemiptera: Aphididae) International Journal of Plant and Soil Science, 2023;35(14): 201-208.
2. Dharavat N, Mehera B, Nath S, Patra SS, Rout S. Effect of sowing dates on population dynamics of mustard aphid (*Lipaphis erysimi*) in mustard (*brassica juncea*) under Allahabad climatic condition. Advances in Life Sciences. 2016;5(20):2278-3849.
3. Sen K, Samanta A, Hansda A, Dhar PP, Samanta A. Bio efficacy and economics of some insecticides against mustard aphid, *Lipaphis erysimi* (Kalt.) infesting mustard. Journal of Crop and Weed. 2017;13(2): 235-237.
4. Sharma N, Upadhyaya SN, Singh UC, Dubey M, Ahmad A.). Bio efficacy of insecticides against mustard aphid. Journal of Entomology and Zoology Studies. 2020;8(4):97-102.
5. Dotasara SK, Agrawal N, Singh N, Swami D. Efficacy of some newer insecticides against mustard aphid *Lipaphis erysimi* Kalt. in cauliflower. Journal of Entomology and Zoology Studies. 2017;5(2):654-656.
6. Pippal SS, Sharma ML, Jatav PK, Mahore P. (). Efficacy of newer insecticides against mustard aphid *Lipaphis erysimi* (Kalt.). The Pharma Innovation Journal, 2022;11(7): 1070-1074.
7. Raju CEP, Tayde AR. (). Field Evaluation of Selected Insecticides and Botanical against Mustard Aphid, *Lipaphis erysimi* (Kalt.) on Mustard, *Brassica juncea* L. International Journal of Plant and Soil Science. 2022;34(22):1188-1193.
8. Sairam B, Kumar A.). Field efficacy of selected bio pesticides and Fipronil against mustard aphid, *Lipaphis erysimi* (Kalt.). The Pharma Innovation Journal, 2022;11(8):1640-1644.
9. Bhatta, K, Chaulagain L, Kafle K, Shrestha J. (). Bio-Efficacy of Plant Extracts against Mustard Aphid (*Lipaphis erysimi* Kalt.) on Rapeseed (*Brassica campestris* Linn.) under Field and Laboratory Conditions. Syrian Journal of Agricultural Research. 2019;6(4):557-566.
10. Sreeja S, Kumar A. Field efficacy of selected chemicals and biopesticides against mustard aphid [*Lipaphis erysimi* (Kaltenbach)] on mustard [*Brassica juncea* (L.)] at Prayagraj (U.P.), Journal of the pharma innovation. 2022;11(5): 1706-1710.
11. Saiteja K, Tayde AR. Efficacy of Chemical Insecticides and Neem Products against Mustard Aphid [*Lipaphis erysimi* (Kalt.)] on Mustard *Brassica juncea* (L.). International Journal of Plant and Soil Science. 2022;34(22): 1118-1122.

© Copyright (2024): Author(s). The licensee is the journal publisher. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:

<https://www.sdiarticle5.com/review-history/117092>