International Journal of Agriculture and Plant Science
www.agriculturejournal.in
Online ISSN: 2664-7664
Received: 31-03-2026, Accepted: 01-05-2026, Published: 16-05-2026
Volume 8, Issue 2, 2026, Page No. 160-162

Efficacy of Neemastra against mustard aphid *Lipaphis Erysimi* (Kaltenbach)

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Abstract
A field experiment was conducted at the Krishi Vigyan Kendra (KVK) Bamanwara (Jalore-II) during the *rabi* season to record the efficacy of Neemastra against mustard aphid (*L. erysimi*). Different doses of Neemastra with seven treatments were applied during the investigation against the mustard aphid. Two foliar sprays were applied during the evening hours at 15-day intervals, from the initial appearance of aphids on the mustard crop. The results revealed that treatments T4 (Neemastra @ 50 ml/litre of water) and T3 (Neemastra @ 40 ml/litre of water) were most effective, with 52.99, 32.99, 16.99 and 50.33, 30.33, 15.66 aphid population upper 10 cm twig on randomly selected plants at 3,7 and 10 days after spray during the first sprays, respectively. While aphid populations during the second spray in the above treatments were 42.33, 26.99, 13.99, and 40.66, 24.66, 12.33 aphids/10 cm twig in selected plants. Treatments T5 and T6 also showed significant reductions in pest populations; however, their efficacy was lower compared to T4 and T3. In contrast, treatments T1 (Neemastra @ 20 ml/litre) and T2 (Neemastra @ 30 ml/litre) exhibited the minimum reduction in aphid population with 78.33, 45.33, 30.99 and 69.66,40.66, 20.33 per 10 cm twig in each randomly selected plant were found to be comparatively less effective than the remaining treatments.

Keywords: Mustard, aphid, neemastra

Introduction
Rapeseed–mustard (*Brassica* spp.) is one of the most important oilseed crops in India and plays a significant role in edible oil production. Among all oilseed crops, rapeseed–mustard stands in a strong position due to its unique characteristics, *viz*., wide adaptability and suitability to diverse environmental conditions. Rapeseed mustard contributes to the national economy due to its high sustainable productivity, low input requirements, and high output.

Rapeseed–mustard (*Brassica spp.*) is the most preferred crop in India in terms of oil consumption after soybean (*Journal of Oilseed Brassica,* 2025). Mustard is a crop with a lower water requirement and can be easily grown in a wide range of environments (from irrigated to rainfed). Driven by the national goal of *Atmanirbharta* (self-reliance) in edible oils, India's mustard production reached a significant milestone of 12.61 million tonnes from an area of 8.63 million hectares during the 2024–25 (Directorate of Economics and Statistics, 2025) [1].

Rajasthan is the pioneer mustard-producing state, accounting for about 45% of the total mustard area and 47% of the total production. (Meena *et al*., 2025) [3]. In 2024-25, Rajasthan produced 52.03 lakh tonnes of mustard over 3.47 million hectares, with a productivity of 14.9 tonnes per hectare, leading the country but still behind the global average of 2.07 tonnes per ha (Journal of Oilseed Brassica, 2025).

The Primary biological constraints to mustard production are mustard aphids (*Lipaphis erysimi*), a major pest capable of causing significant yield losses ranging from 10 to 90 per cent. Mustard aphids are able to cause significant oil loss of 2-4 per cent in grains and also degrade the quality of oil as well as grains (Singh *et al,* 2024) [5]

A slight increase in winter temperatures and humidity allows the aphid population to multiply rapidly. A need for a sustainable approach to minimise pest populations during peak incidence without chemical pesticides. Neemastra is a highly effective, cost-effective, and eco-friendly alternative that leverages changing climate conditions to suppress pest populations without damaging the environment (Yadav *et al.,* 2025) [8].

Materials and Methods
Experimental Site and Design
A field experiment was conducted to evaluate the efficacy of Neemastra against the mustard aphids during *rabi* 2025-26 at the KVK instructional farm. The experiment, comprising seven treatments (including a control), was laid out in an RBD, with each treatment replicated three times. Each plot was measured with a 4 x 4-meter square, and all recommended agronomic practices were followed during the experiment.

Preparation of Neemastra
Neemastra was prepared using the ingredients listed in Table 1. The prepared mixture was kept to ferment for 72 hours in a plastic container. The prepared mixture was stirred twice a day during the fermentation period. After fermentation, the mixture was filtered through a muslin cloth.

Table 1: Composition of Neemastara

S.No.	Material	Quantity
1.	Water	100 Lit.
2.	Cow Dung	5 Kg
3.	Cow Urine	5 Kg
4.	Paste of Neem Leaves	5 Kg

Table 2: Details of Treatment

Treatment	Description
T_1	Neemastra @ 20 ml/litre of water
T_2	Neemastra @ 30 ml/litre of water
T_3	Neemastra @ 40 ml/litre of water
T_4	Neemastra @ 50 ml/litre of water
T_5	Neemastra @ 60 ml/litre of water
T_6	Neemastra @ 70 ml/litre of water
T_7	Control (untreated)

Methodology: All above treatments were applied twice during pest initiation at 15-day intervals, and observations were recorded on 10 randomly selected plants with the upper 10 cm of the twig at 3, 7, and 10 days after each spray, respectively.

Statistical Analysis

The data collected from the field experiment were statistically analyzed

- Per cent reduction of aphids can be calculated as:

To calculate the corrected per cent reduction of pest population using the Henderson and Tilton formula was used.

Henderson and Tilton Formula

Where:

- population before treatment in treated plot
- population after treatment in the treated plot
- population before treatment in the control plot
- population after treatment in the control plot

Results and Discussion

The results on the bio-efficacy of Neemastra against mustard aphid are presented in Table 3. All treatments were superior to the control. A significant reduction in aphid population was observed at 3, 7 and 10 days after sprays. The minimum population was recorded in T_4 (Neemastra @ 50 ml/litre of water), with 52.99, 32.99, and 16.99 aphids/10 cm twig at 3, 7, and 10 days after sprays, respectively. T_3 (Neemastra @ 40 ml/litre of water) and T_5 (Neemastra @ 60 ml/litre of water) were also effective, with 50.33, 30.33, 15.66, and 50.00, 32.00, 17.00, respectively. However, increasing concentration beyond 60 ml/litre did not show an increase in efficacy; similarly, decreases in concentration beyond 40 ml/litre did not show a proportionate increase in bio-efficacy. In contrast, the control plot showed a continuous increase in aphid population from 190 at 3 DAS to 210 at 10 DAS, indicating pest population multiplication. The results confirm the effectiveness of Neemastra in managing mustard aphid, with 40–60 ml/litre identified as the optimum dose range under the present study conditions.

Table 3: Bio-efficacy of Neemastra against mustard aphid (1st Spray)

Treatment	Population before Treatment	Population of Aphids (10 cm/twig)	Population of Aphids (10 cm/twig)	Population of Aphids (10 cm/twig)
Treatment	**Population before Treatment**	**3 DAS**	**7 DAS**	**10 DAS**
T1: Neemastra 20 ml/ litre of water	140.66	78.33 (50.65)	45.33 (72.81)	30.99 (82.41)
T2: Neemastra 30 ml/ litre of water	160.99	69.66 (61.63)	40.66 (78.70)	20.33 (89.90)
T3: Neemastra 40 ml/ litre of water	155.66	50.33 (71.31)	30.33 (83.57)	15.66 (91.96)
T4: Neemastra 50 ml/ litre of water	165.33	52.99 (71.56)	32.99 (83.16)	16.99 (91.78)
T5: Neemastra 60 ml/ litre of water	148.00	50.00 (70.07)	32.00 (81.76)	17.00 (90.81)
T6: Neemastra 70 ml/ litre of water	172.33	60.33 (68.97)	42.66 (79.13)	18.66 (91.35)
T7: Control	168.66	190.33	200.00	210.99

Figure in parenthesis are percent reduction

Table 4: Bio-efficacy of Neemastra against mustard aphid (2nd Spray)

Treatment	Population before Treatment	Population of Aphids (10 cm/twig)	Population of Aphids (10 cm/twig)	Population of Aphids (10 cm/twig)
Treatment	**Population before Treatment**	**3 DAS**	**7 DAS**	**10 DAS**
T1: Neemastra 20 ml/ litre of water	120.33	62.66 (56.20)	24.99 (85.22)	24.99 (85.97)
T2: Neemastra 30 ml/ litre of water	130.66	55.33 (64.35)	32.33 (82.38)	16.33 (91.55)
T3: Neemastra 40 ml/ litre of water	145.00	40.66 (76.49)	24.66 (87.88)	12.33 (94.25)
T4: Neemastra 50 ml/ litre of water	155.00	42.33(76.91)	26.99 (87.60)	13.99 (93.90)
T5: Neemastra 60 ml/ litre of water	140.33	40.00 (75.99)	25.00 (87.31)	13.00 (93.74)
T6: Neemastra 70 ml/ litre of water	125.99	48.00 (67.94)	34.00 (80.76)	14.66 (92.14)
T7: Control	135.33	160.66	190.00	200.33

Figure in parenthesis are percent reduction

The results on the bio-efficacy of Neemastra against mustard aphid after the second spray are presented in Table 4. All treatments were superior to the control. A significant reduction in aphid population was observed at 3, 7 and 10 days after sprays. The minimum population was recorded in T_4 (Neemastra at 50 ml/litre of water) with 42.33, 26.99, and 13.99 aphids/10 cm twig at 3, 7, and 10 days after

sprays, respectively. T_3 (Neemastra @ 40 ml/litre of water) and T5 (Neemastra @ 60 ml/litre of water**)** were also effective, with 40.66, 24.66, 12.33 and 40.00, 25.00, 13.00, respectively. and similar reductions in aphid population due to neem-based formulations have also been reported by earlier workers (Prasad *et al.,* 2025 and Jat *et al.,* 2025) [2, 4]. Other (Tak *et al*., 2024) [7] workers confirmed that neem-based botanical pesticides effectively suppressed aphid populations through antifeedant and growth-inhibitory effects. However, increasing concentrations beyond 60 ml/litre of water did not increase efficacy; similarly, decreases in concentration beyond 40 ml/litre of water did not decrease efficacy. The control plot showed a continuous increase in aphid population from 190 at 3 DAS to 210 at 10 DAS, indicating pest population multiplication. Overall, the results confirm the effectiveness of Neemastra in managing mustard aphid, with 40–60 ml/litre identified as the optimum dose range under the present study conditions.

Conclusion

It is concluded that Neemastra is the best eco-friendly alternative for managing aphid populations in mustard. Different neem doses at 3, 7, and 10 days after spray effectively reduced aphid populations. However, increasing concentration beyond 60 ml/litre did not increase efficacy; similarly, decreases in concentration beyond 40 ml/litre did not result in population reduction. A dose of Neemastra at 50 and 40 ml/litre of water was found effective against aphid populations.

Conflict of interest: All authors declare that they have no conflict of interest

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