International Journal of Agriculture and Food Science 2025; 7(9): 727-731

ISSN Print: 2664-844X
ISSN Online: 2664-8458
NAAS Rating (2025): 4.97
IJAFS 2025; 7(9): 727-731
www.agriculturaljournals.com
Received: 09-07-2025
Accepted: 11-08-2025

Dinesh Wayal
M. Sc. Student, Department of Entomology, College of Agriculture, Dhule, 424004, Mahatma Phule Krishi Vidyapeeth, Rahuri, Ahilyanagar, Maharashtra, India

Mahesh Bharati
Assistant Professor of Entomology, AICRP on Chickpea, Pulses Improvement Project, Mahatma Phule Krishi Vidyapeeth, Rahuri, Ahilyanagar, Maharashtra, India

Prasad Avhad
M. Sc. Student, Department of Entomology, College of Agriculture, Dhule, 424004, Mahatma Phule Krishi Vidyapeeth, Rahuri, Ahilyanagar, Maharashtra, India

Yogesh Shaniware
Ph.D. Scholar, Department of Genetics and Plant Breeding, College of Horticulture, University of Horticultural Sciences, Bagalkot, Karnataka, India

Akshay Sawant
Ph.D. Scholar, Department of Vegetable Science, College of Horticulture, University of Horticultural Sciences, Bagalkot, Karnataka, India

Kiran Kolhe
M. Sc. Student, Department of Entomology, College of Agriculture, Dhule, 424004, Mahatma Phule Krishi Vidyapeeth, Rahuri, Ahilyanagar Maharashtra, India

Aniket Ahire
M. Sc. Student, Department of Entomology, College of Agriculture, Dhule, 424004, Mahatma Phule Krishi Vidyapeeth, Rahuri, Ahilyanagar Maharashtra, India

Ravindra Vasave
M. Sc. Student, Department of Entomology, College of Agriculture, Dhule, 424004, Mahatma Phule Krishi Vidyapeeth, Rahuri, Ahilyanagar Maharashtra, India

Pooja Toradmal
M. Sc. Student, Department of Entomology, College of Agriculture, Dhule, 424004, Mahatma Phule Krishi Vidyapeeth, Rahuri, Ahilyanagar Maharashtra, India

Corresponding Author:
Dinesh Wayal
M. Sc. Student, Department of Entomology, College of Agriculture, Dhule, 424004, Mahatma Phule Krishi Vidyapeeth, Rahuri, Ahilyanagar, Maharashtra, India

Effect of Different Ready-Mix Insecticidal Combinations on Ladybird Beetle (*Coccinella* spp.*)* of Drumstick

Dinesh Wayal, Mahesh Bharati, Prasad Avhad, Yogesh Shaniware, Akshay Sawant, Kiran Kolhe, Aniket Ahire, Ravindra Vasave and Pooja Toradmal

DOI: https://www.doi.org/10.33545/2664844X.2025.v7.i9j.818

Abstract
The present study entitled "Effect of different ready-mix insecticidal combinations on ladybird beetle (*Coccinella* spp.*)* of Drumstick" was undertaken at Krishi Vigyan Kendra, Dhule (Maharashtra)-424004 during *kharif-rabi,* 2024-25. Ladybird beetles are among the most important groups of predatory insects occurring in agricultural and horticultural ecosystems. This is important to see how the ladybird population is influenced by the application of various insecticidal mixture which are commonly applied on drumstick plants. The present study focused on the population analysis of ladybird beetle. The results showed that the lambda-cyhalothrin 4.6% + Chlorantraniliprole 9.3% ZC did not significantly impact ladybird beetle populations which is a good strategy to use in IPM. Propargite 50% + Bifenthrin 5% SE also supported ladybird beetle conservation, indicating a balanced pest management strategy.

Keywords: *Moringa oleifera* Lam., ladybird beetle, natural enemies

Introduction
The drumstick tree, or *Moringa oleifera* Lam., is a highly valuable crop that is native to India and is grown extensively throughout tropical and subtropical countries for its economic, medicinal, and nutritional value. Often referred to as the "Kalpavriksha of dryland regions," moringa is utilized for food, medicine, manure, and dye manufacture. It also contains vitamins, minerals, and antioxidants. With 2.2 million tons grown in 2022 alone, India is the world's leading producer, accounting for almost 80% of worldwide supply (Samsai, 2023 and Fuglie, 2000) [10, 4]. However, moringa production is greatly impacted by biotic pressures, especially insect pests, which lower yield and quality (Godino *et al.* 2017; Butani & Verma, 1981) [5, 2].

Aphids, whiteflies, thrips, hairy caterpillars, *Noorda blitealis*, *Gitona distigma*, and other pests negatively impact various moringa plant parts, especially in the summer (Chandraker and Gupta, 2020; Sivagami and David, 1968) [3, 11]. Thus, it is crucial to comprehend the seasonal occurrence of pests and assess efficient pest management techniques, especially ready-mix insecticidal combinations. Research on insect pest attacks at various crop growth stages and their relationship to meteorological factors yields important data (Shelke *et al*., 2024b) [13]. Such data is used to forecast insect damage and create forecast models that support the creation of pest management plans (Shelke *et al*., 2024a) [12]. To help create effective and sustainable pest control strategies, the current study focuses on determining seasonal incidence and evaluating the effectiveness of insecticides against important moringa pests (Thumar *et al*. 2017and Anjaneyamurthy; Regupathy, 1989) [14, 1]. Ladybird beetles are among the most important groups of predatory insects occurring in agricultural and horticultural ecosystems. As natural enemies of a number of soft-bodied insect pests, especially mealybugs, scale insects, aphids, and whiteflies, they are essential to ecological balance and natural pest suppression. Ladybird beetles are common dominant predators of major sucking pests like tree hoppers (*Oxyrhachis tarandus*), aphids (*Aphis craccivora*), and whiteflies (*Bemisia tabaci*) in the drumstick ecosystem (*Moringa oleifera* Lam.

Materials and Methods

The present investigation on the Effect of different ready-mix insecticidal combinations on ladybird beetle (*Coccinella* spp.) of Drumstick was conducted during the year 2024-2025 at the experimental farm of Krishi Vigyan Kendra, Dhule, Maharashtra. For the present study, the PKM-2 variety of drumstick was selected. The pre-treatment observations on ladybird beetle of drumstick were recorded one day prior to first spray and subsequently at 3, 7 and 15 days after each spray. The observation on the identification of predators and emergence of parasitoids was carried out by collecting the larval samples from field and observed in laboratory. Also, it was confirmed with respect to their feeding habit. The experimental layout followed a Randomized Block Design (RBD), and statistical significance was determined according to the procedure outlined by Panse and Sukhatme (1985) [9].

Results and Discussion

Efficacy of different ready-mix insecticidal combinations against ladybird beetle (*Coccinella* spp.) on Drumstick:

Despite being frequently considered beneficial predators, ladybird beetles (Coccinellidae) were observed as non-target arthropods when insecticide applications were evaluated in drumsticks (*Moringa oleifera* Lam). The ecological selectivity and safety of insecticidal treatments can be better understood by tracking their population dynamics after treatment. The effects of various ready-mix insecticide combinations on ladybird beetle populations per plant over three sprays and intervals are shown in Table 1.

First spraying

At 3 DAS, the lowest population of ladybird beetles was recorded in T_5 (Propargite 50% + Bifenthrin 5% SE) with 5.33 beetles/plant, which was statistically at par with T_6 (Fipronil 40% + Imidacloprid 40% WG) at 3.20 beetles/plant, T_1 (Bifenthrin 8% + Clothianidin 10% SC) at 4.22 beetles/plant, T_2 (Profenofos 40% + Cypermethrin 4% EC) at 4.09 beetles/plant and T_4 (Pyriproxyfen 8% + Dinotefuran 5% + Diafenthiuron 18% SC) at 4.36 beetles/plant. These were followed by T_3 (Clothianidin 3.5% + Pyriproxyfen 8% SE) with 4.88 beetles/plant and T_7 (Lambda-cyhalothrin 4.6% + Chlorantraniliprole 9.3% ZC) at 5.61 beetles/plant, which were on par with the untreated control T_8 (5.98 beetles/plant).

At 7 DAS, the minimum beetle population was observed in T_6 (Fipronil 40% + Imidacloprid 40% WG) with 2.68 beetles/plant and was statistically on par with T_5 (Propargite 50% + Bifenthrin 5% SE) at 4.42 beetles/plant, T_2 (Profenofos 40% + Cypermethrin 4% EC) at 3.03 beetles/plant, T_1 (Bifenthrin 8% + Clothianidin 10% SC) at 3.76 beetles/plant, T_4 (Pyriproxyfen 8% + Dinotefuran 5% + Diafenthiuron 18% SC) at 3.90 beetles/plant and T_7 (Lambda-cyhalothrin 4.6% + Chlorantraniliprole 9.3% ZC) at 4.64 beetles/plant. The highest population was recorded in the untreated control T_8 (5.20 beetles/plant).

At 15 DAS, T_6 (Fipronil 40% + Imidacloprid 40% WG) once again recorded the lowest population (4.47 beetles/plant) and was statistically at par with T_2 (Profenofos 40% + Cypermethrin 4% EC) at 4.74 beetles/plant, T_1 (Bifenthrin 8% + Clothianidin 10% SC) at 5.08 beetles/plant, T_4 (Pyriproxyfen 8% + Dinotefuran 5% + Diafenthiuron 18% SC) at 5.45 beetles/plant, T_5 (Propargite 50% + Bifenthrin 5% SE) at 5.90 beetles/plant, and T_7 (Lambda-cyhalothrin 4.6% + Chlorantraniliprole 9.3% ZC) at 6.56 beetles/plant. The highest count was in T_8 (6.89 beetles/plant).

Second spraying

At 3 DAS of second spray, T_6 (Fipronil 40% + Imidacloprid 40% WG) again showed the lowest population (3.82 beetles/plant) and was statistically on par with T_2 (Profenofos 40% + Cypermethrin 4% EC) at 4.38 beetles/plant, T_4 (Pyriproxyfen 8% + Dinotefuran 5% + Diafenthiuron 18% SC) at 5.15 beetles/plant, and T_1 (Bifenthrin 8% + Clothianidin 10% SC) at 4.81 beetles/plant. These were followed by T_7 (Lambda-cyhalothrin 4.6% + Chlorantraniliprole 9.3% ZC) at 6.30 beetles/plant, T_5 (Propargite 50% + Bifenthrin 5% SE) at 5.96 beetles/plant, and T_3 (Clothianidin 3.5% + Pyriproxyfen 8% SE) at 5.37 beetles/plant. The untreated control T_8 recorded 6.70 beetles/plant.

At 7 DAS, the lowest count was again in T_6 (Fipronil 40% + Imidacloprid 40% WG) at 6.10 beetles/plant and was on par with T_2 (Profenofos 40% + Cypermethrin 4% EC) at 5.14 beetles/plant, T_1 (Bifenthrin 8% + Clothianidin 10% SC) at 5.66 beetles/plant, T_4 (Pyriproxyfen 8% + Dinotefuran 5% + Diafenthiuron 18% SC) at 5.80 beetles/plant, and T_5 (Propargite 50% + Bifenthrin 5% SE) at 6.45 beetles/plant. Highest count was in T_8 (7.77 beetles/plant).

At 15 DAS, T_6 (Fipronil 40% + Imidacloprid 40% WG) recorded the lowest population (5.19 beetles/plant) followed by T_2 (Profenofos 40% + Cypermethrin 4% EC) at 5.42 beetles/plant, T_1 (Bifenthrin 8% + Clothianidin 10% SC) at 5.92 beetles/plant, and T_5 (Propargite 50% + Bifenthrin 5% SE) at 6.75 beetles/plant. The maximum population (8.63 beetles/plant) was observed in the untreated control T_8.

Third spraying

At 3 DAS of third spray, the least population was found in T_6 (Fipronil 40% + Imidacloprid 40% WG) (5.99 beetles/plant), followed by T_2 (Profenofos 40% + Cypermethrin 4% EC) (6.21 beetles/plant), T_1 (Bifenthrin 8% + Clothianidin 10% SC) (6.57 beetles/plant), and T_4 (Pyriproxyfen 8% + Dinotefuran 5% + Diafenthiuron 18% SC) (6.88 beetles/plant). Highest count was in T_8 (8.79 beetles/plant).

At 7 DAS, T_6 (Fipronil 40% + Imidacloprid 40% WG) recorded 6.24 beetles/plant which was on par with T_1 (Bifenthrin 8% + Clothianidin 10% SC) at 6.83 beetles/plant and T_4 (Pyriproxyfen 8% + Dinotefuran 5% + Diafenthiuron 18% SC) at 7.18 beetles/plant. The highest population (9.00 beetles/plant) was observed in the untreated control T_8.

At 15 DAS, minimum population was noted in T_6 (Fipronil 40% + Imidacloprid 40% WG) (7.30 beetles/plant), followed by T_2 (Profenofos 40% + Cypermethrin 4% EC) at 7.80 beetles/plant and T_4 (Pyriproxyfen 8% + Dinotefuran 5% + Diafenthiuron 18% SC) at 8.69 beetles/plant. Highest population was in T_8 (10.21 beetles/plant).

Mean of three spray

Lambda-Cyhalothrin 4.6% + Chlorantraniliprole 9.3% ZC did not significantly impact ladybird beetle populations, indicating that they are safer to employ in integrated pest management (IPM) strategies. Certain insecticidal combinations, such as Fipronil 40% + Imidacloprid 40% WG and Profenofos 40% + Cypermethrin 4% EC, decreased the number of predators and ought to be applied sparingly.

Lambda-Cyhalothrin 4.6% + Chlorantraniliprole 9.3% ZC was thus found to be the safest and selective combination for ladybird beetles. As such, it is a suitable part of integrated pest management (IPM) strategies in drumstick cultivation. Tiwari *et al*., (2020) [15] found the similar results while working on mustard.

Plate 1: Lady Bird Beetle, *Coccinella* spp.

Table 1: Efficacy of ready-mix insecticidal combinations against Ladybird beetle during kharif-rabi, 2024-2025

Treatment Details			Population of ladybird beetle/ plant										
			First spray				Second spray			Third spray			Three sprays Mean
Tr. No.	Treatment	Dose/ litre	BS	3 DAS	7 DAS	15 DAS	3 DAS	7 DAS	15 DAS	3 DAS	7 DAS	15 DAS	
T1	Bifenthrin 8 % + Clothianidin 10 % SC	1ml	2.93 (1.84)	4.22 (2.17)	3.76 (2.06)	5.08 (2.36)	4.81 (2.30)	5.66 (2.48)	5.92 (2.53)	6.57 (2.65)	6.83 (2.71)	8.12 (2.94)	5.66 (2.47)
T2	Profenofos 40 % + Cypermethrin 4 % EC	2 ml	2.53 (1.73)	4.09 (2.14)	3.03 (1.88)	4.74 (2.29)	4.38 (2.20)	5.14 (2.37)	5.42 (2.43)	6.21 (2.59)	6.50 (2.65)	7.80 (2.88)	5.26 (2.38)
T3	Clothianidin 3.5 % + Pyriproxyfen 8% SE	3 ml	3.30 (1.94)	4.88 (2.32)	4.00 (2.12)	5.78 (2.51)	5.37 (2.42)	6.02 (2.55)	6.55 (2.65)	7.33 (2.79)	7.59 (2.84)	9.11 (3.10)	6.29 (2.59)
T4	Pyriproxyfen 8 % + Dinotefuran 5 % + Diafenthiuron 18% SC	1.2 ml	3.08 (1.88)	4.36 (2.20)	3.90 (2.10)	5.45 (2.44)	5.15 (2.37)	5.80 (2.51)	6.34 (2.61)	6.88 (2.71)	7.18 (2.77)	8.69 (3.03)	5.97 (2.53)
T5	Propargite 50 % + Bifenthrin 5% SE	2.2 ml	2.67 (1.77)	5.33 (2.41)	4.42 (2.22)	5.90 (2.53)	5.96 (2.54)	6.45 (2.64)	6.75 (2.69)	7.88 (2.89)	7.95 (2.90)	9.66 (3.19)	6.70 (2.67)
T6	Fipronil 40 % + Imidacloprid 40 % WG	0.30 gm	2.80 (1.81)	3.20 (1.92)	2.68 (1.78)	4.47 (2.23)	3.82 (2.07)	6.10 (2.56)	5.19 (2.38)	5.99 (2.54)	6.24 (2.59)	7.30 (2.79)	5.00 (2.32)
T7	Lambda-cyhalothrin 4.6% +Chlorantraniliprole 9.3% ZC	0.5 ml	3.21 (1.91)	5.61 (2.45)	4.64 (2.27)	6.56 (2.66)	6.30 (2.60)	6.78 (2.69)	7.20 (2.77)	8.12 (2.93)	8.34 (2.97)	9.80 (3.20)	7.04 (2.73)
T8	Untreated control		3.65 (2.02)	5.98 (2.53)	5.20 (2.39)	6.89 (2.72)	6.70 (2.67)	7.77 (2.87)	8.63 (3.02)	8.79 (3.04)	9.00 (3.07)	10.21 (3.27)	7.69 (2.84)
	SEm ±		NS	0.11	0.02	0.02	0.11	0.06	0.10	0.10	0.10	0.09	0.08
	CD @5%			0.32	0.07	0.06	0.33	0.19	0.32	0.31	0.30	0.28	0.24
	CV %			8.17	2.00	1.41	7.94	4.29	6.92	6.36	6.11	5.30	5.39

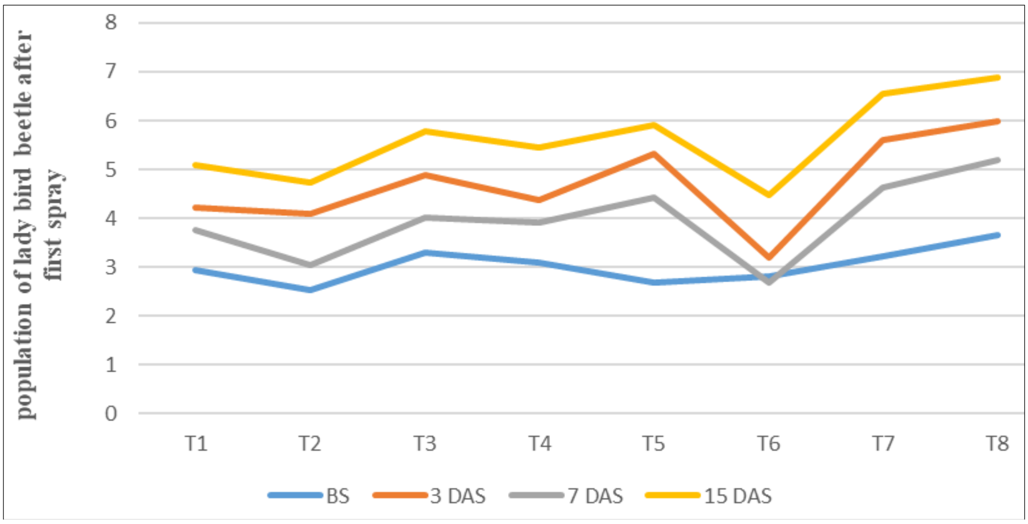

Fig 1 (A): Effect of ready-mix insecticides against ladybird beetle after I Spray

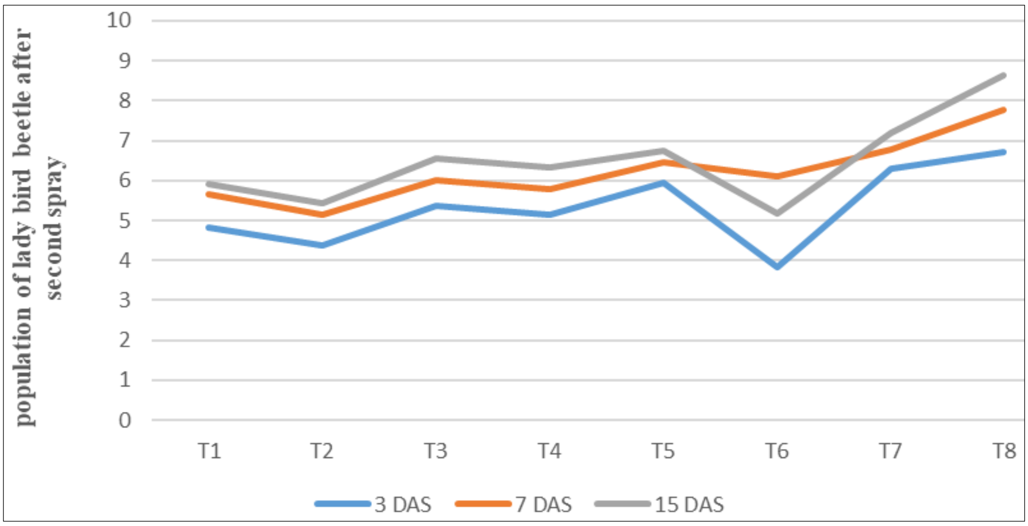

Fig 1 (B): Effect of ready-mix insecticides against ladybird beetle after II Spray

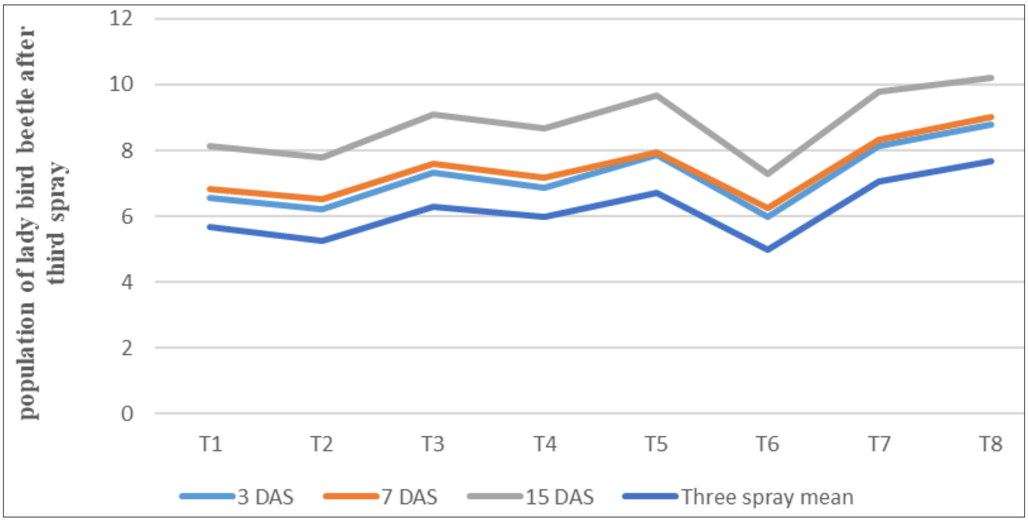

Fig 1(C): Effect of ready-mix insecticides against ladybird beetle after III Spray

Conclusion

lambda-cyhalothrin 4.6% + chlorantraniliprole 9.3% zc did not significantly impact ladybird beetle populations, indicating that they are safer to employ in integrated pest management (ipm) strategies. propargite 50% + bifenthrin 5% se (t_5) also supported ladybird beetle conservation. certain insecticidal combinations, such as fipronil 40% + imidacloprid 40% wg and profenofos 40% + cypermethrin 4% ec, decreased the number of predators and ought to be applied sparingly.

Declaration

I hereby declare that the research work entitled "Effect of different ready-mix insecticidal combinations on ladybird beetle (*Coccinella* spp.) of Drumstick" submitted to International Journal of Agriculture and Food Science, is the original work carried out by me under the guidance of Dr. M. S. Bharati (Assistant Professor of Entomology, AICRP on Chickpea, Pulses Improvement Project, MPKV, Rahuri). All sources of information and data from other researchers have been duly acknowledged and referenced. I take full responsibility for the authenticity of the data and contents of this work. All the authors contributed equally in preparing this manuscript.

Acknowledgement

I would also like to thank the staff of [KRISHI VIDYAN KENDRA. DHULE] for providing the necessary facilities and a conducive environment for the smooth conduct of this research. Lastly, I express my heartfelt thanks to my family and friends for their moral support, patience, and encouragement during the entire period of this research journey.

References

1. Anjaneyamurthy JN, Regupathy A. Insecticidal control of fruit fly, Gitona spp, caterpillar, Noorda blitealis Walker and aphid, Aphis craccivora Koch. on annual Moringa. South Indian Hortic. 1989;37(2):84-93.
2. Butani DK, Verma S. Insect pests of vegetables and their control: Drumsticks. Pesticides. 1981;15(10):29-31.
3. Chandrakar T, Gupta AK. Seasonal incidence of insect pests on drumstick (*Moringa oleifera* Lamk.). J Entomol Zool Stud. 2020;8(4):1384-7.
4. Fuglie LJ. New uses of Moringa studied in Nicaragua. ECHO Dev Notes. 2000;68.
5. Godino M, Arias C, Izquierdo MI. *Moringa oleifera*: potential areas of cultivation on the Iberian Peninsula. Acta Hortic. 2017;1158:405-11.
6. Hodek I, Honěk A. Scale insects, mealybugs, whiteflies and aphids as prey of ladybirds. Biol Control. 2009;51(2):232-43.
7. Mahamuni SM, Patil SS, Bachhav SS, Shaniware YA. Implementation of drone technology for precision pest management in advanced agriculture. Int J Stat Appl Math. 2024;9(4):13-8.
8. Mahajan G, Dwivedi SA, Shaniware Y, Bachhav S, Kale D. Integrated management and seasonal dynamics of *Helicoverpa armigera* in chickpea: a review. J Sci Res Rep. 2025;31(6):96-102.
9. Panse VG, Sukhatme PV. Statistical methods for agricultural workers. 4th ed. New Delhi: Indian Council of Agricultural Research; 1985.
10. Samsai T. A study on moringa production and marketing in the southern region of Tamil Nadu. Pharma Innov J. 2023;12(11):1947-52.
11. Sivagami R, David BV. Some insect pests of moringa (*Moringa oleifera* Lamk.) in South India. South Indian Hort. 1968;16:69-71.
12. Shelke SB, Patil BV, Mutkule DS, Bombale AB, Shaniware YA, Marathe MS. To study the population dynamics of major insect pests in black gram (*Vigna mungo* L. Hepper) in relation to weather parameter. Int J Agric Ext Soc Dev. 2024;7(5):23-30.
13. Shelke SB, Patil BV, Mutkule DS, Shaniware YA, Bombale AB, Marathe MS. Genotypic assessment of black gram (Vigna mungo L) combating against major insect pests. Int J Res Agron. 2024;SP-7(6):462-73.
14. Thumar RK, Borad MG, Padaliya SR, Borad PK. First report of leaf eating caterpillar Noorda blitealis Walker (Lepidoptera: Crambidae) infesting drumstick, Moringa oleifera Lam. from middle Gujarat. Trends Biosci. 2017;10(22):4324-5.
15. Tiwari A, Singh AK, Tripathi S. Population dynamics of aphids and their predators and impact of insecticides on predator complex in mustard crop. J Plant Prot Res. 2020;60(2):223-9.