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Evaluation of different insecticides against aphid on summer mungbean

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Abstract

A field experiment was conducted on mungbean crop to evaluate different insecticides against aphid, *Aphis craccivora* during summer season of 2022. The results indicated that minimum aphid adult populations was recorded in treatment where Seed treatment with imidacloprid 600FS @5ml/kg seed + thiamethoxam 25WG @ 0.3 ml/l (First spray: 0.7, 1.04 and 0.95 aphid / top 5 cm shoot at 3, 7 and 10 days after spray (DAS); Second spray: 0.91, 1.2 and 1.5 adults/ top 5 cm shoot at 3, 7 and 10 DAS, respectively) Whereas, overall mean 1.05 Aphid / top 5 cm shoot was recorded.

Keywords: Aphid, *Aphis craccivora*, mungbean, IPM 02-3, insecticide

Introduction

Mung bean (*Vigna radiata* L. Wilczek), a member of the Fabaceae family, is valued worldwide as a nutritious source of proteins, carbohydrates, and vitamins. This important grain legume is widely cultivated in tropical and subtropical regions (Asante, Tamo & Jackai, 2002) [1]. Known for its high protein content and easy digestibility, mung bean stands out among other pulses due to its non-flatulent nature (Ghafoor, Ahmad & Quyyum, 2003) [2]. Additionally, it enhances soil fertility through nitrogen fixation via its root nodules (Hoorman, Islam & Sundermeier, 2009) [3].

However, mung beans face threats from various insect species, particularly sap-sucking pest like Aphid, *Aphis craccivora* (Isman, 2008) [4]. These pests weaken the plants by draining their sap and spreading diseases, which hampers photosynthesis and significantly reduces the yield. Therefore, present study was undertaken to evaluate the efficacy of different insecticides against Aphid, *Aphis craccivora*, in mungbean.

Materials and Methods

The present study was undertaken at the Research Farm, Rice section, Birsa Agricultural University, Kanke during Summer, 2022. Mungbean crop, variety IPM 02-3 was sown on 1st March, 2022 in a randomized block design (RBD) with three replications having plot size of 9 sqm each. Plant to plant and row to row spacing was maintained 10cm and 30 cm, respectively. All the recommended agronomic package of practices were followed to raise the good crop. Aphid adult population were recorded from five randomly selected plants in each replication, one day before spraying of insecticide and then at 3, 7 and 10 days after spray (First spray: 30 days after sowing, second spray: 10 days after the first spray). The data was statistically analyzed with analysis of variance (ANOVA) and means were separated by using critical difference (CD) test at 5% level of significance.

Results and Discussion

Before spraying, the aphid population ranged from 2.96 to 3.3 per top 5 cm of shoot. After the first spray, the average population varied between 0.89 and 4.29 per top 5 cm of shoot. The lowest number of aphids (0.89) was seen in the T₈ treatment (Seed treatment with imidacloprid 600FS @5ml/kg seed + thiamethoxam 25WG @ 0.3 ml/l), followed closely by T₅ (0.94) and T₃ (1.06). The control group had the highest aphid count. During the second spray, the same trend continued, with the mean aphid population per trifoliolate leaf ranging from 1.2 to 7.39. Once again, T₈ showed the least aphids (1.2), followed by T₅ (1.47) and T₃

(1.6). The control group recorded the highest aphid count per trifoliolate (7.39). The combined results from both spray applications showed that the aphid population was effectively controlled by treatment T₈ (seed treatment with imidacloprid 600FS at 5 ml/kg seed plus thiamethoxam 25WG at 0.3 ml/l), which resulted in an aphid count of 1.05. This effectiveness was comparable to treatment T₅ (seed treatment with imidacloprid 600FS at 5 ml/kg seed plus Spinosad 45 SC at 0.30 ml/l), which had an aphid count of 1.20, and treatment T₃ (seed treatment with imidacloprid

600FS at 5 ml/kg seed plus Diafenthiuron 50 WP at 1.25 ml/l), which had an aphid count of 1.33. The results of this study align with Shobharani *et al.* (2019)^[8], who found that treating seeds with imidacloprid and subsequently spraying thiamethoxam were highly effective against sucking pests such as aphids and jassids. Similarly, the findings are consistent with those of Kar *et al.* (2018)^[5] and Rajawat *et al.* (2017)^[7], who also reported that using imidacloprid for seed treatment and thiamethoxam for spraying proved very effective against pests like whiteflies, aphids, and thrips.

Table 1: Efficacy of different insecticides against aphid on mungbean during summer 2022

Treatments	Before Spray	Aphid (numbers / top 5 cm shoot)								Overall Mean
		1st Spray (30 days after sowing)			MEAN	2nd Spray (40 days after sowing)			MEAN	
		3 DAS	7 DAS	10 DAS		3 DAS	7 DAS	10 DAS		
T ₁ : Seed Treatment with imidacloprid 600 FS @ 5ml/Kg seed	3	3.14 (2.034)*	3.4 (2.094)	3.53 (2.126)	3.36 (2.087)	3.65 (2.155)	4.13 (2.263)	3.5 (2.113)	3.76 (2.181)	3.56 (2.135)
T ₂ : T ₁ + <i>Bt</i> var. <i>kurstaki</i> @ 2g/l	3.01	3.08 (2.019)	3.34 (2.085)	3.45 (2.107)	3.29 (2.071)	3.62 (2.147)	4.25 (2.291)	3.45 (2.098)	3.77 (2.183)	3.53 (2.129)
T ₃ : T ₁ + Diafenthiuron 50 WP @ 1.25 g/l	3.3	0.91 (1.375)	0.96 (1.387)	1.3 (1.516)	1.06 (1.433)	1.25 (1.491)	1.4 (1.534)	2.15 (1.764)	1.6 (1.608)	1.33 (1.524)
T ₄ : T ₁ + Pyriproxyfen 10 EC @ 2.00 ml/l	3.1	1.69 (1.64)	1.37 (1.537)	1.71 (1.646)	1.59 (1.609)	1.88 (1.698)	2.33 (1.825)	3.34 (2.078)	2.52 (1.868)	2.05 (1.746)
T ₅ : T ₁ + Spinosad 45 SC @ 0.30 ml/l	3.02	0.77 (1.317)	0.99 (1.39)	1.05 (1.431)	0.94 (1.391)	1.1 (1.427)	1.3 (1.492)	2 (1.702)	1.47 (1.566)	1.2 (1.482)
T ₆ : T ₁ + Chlorantraniliprole 18.5 SC @ 0.20 ml/l	3.02	3.06 (2.012)	1.85 (1.681)	3.56 (2.135)	2.82 (1.946)	3.4 (2.089)	3.06 (2.011)	3.6 (2.136)	3.35 (2.086)	3.09 (2.019)
T ₇ : T ₁ + Azadirachtin 10000 ppm @ 1.5 ml/l	2.96	2.92 (1.944)	1.36 (1.514)	2.8 (1.944)	2.36 (1.822)	2.78 (1.889)	3.45 (2.043)	3.15 (1.967)	3.13 (2.03)	2.74 (1.935)
T ₈ : T ₁ + Thiamethoxam 25 WG @ 0.30 g/l	3.1	0.7 (1.295)	1.04 (1.427)	0.95 (1.395)	0.89 (1.376)	0.91 (1.364)	1.2 (1.462)	1.5 (1.535)	1.2 (1.482)	1.05 (1.429)
T ₉ : T ₁ + NSKE @ 5%	3.1	2.42 (1.847)	2.75 (1.92)	3.03 (1.981)	2.73 (1.931)	3.06 (2.011)	3.18 (2.043)	3.33 (2.076)	3.19 (2.047)	2.96 (1.99)
T ₁₀ : T ₁ + Karanj oil @ 5%	3.09	2.84 (1.96)	2.95 (1.986)	3.85 (2.185)	3.21 (2.05)	3.22 (2.055)	3.45 (2.11)	3.23 (2.051)	3.3 (2.073)	3.26 (2.063)
T ₁₁ : Control	3.05	3.2 (2.046)	4.67 (2.379)	5 (2.425)	4.29 (2.293)	5.33 (2.514)	6.33 (2.706)	10.5 (3.388)	7.39 (2.872)	5.84 (2.601)
C.D.	NS	0.338	0.348	0.38	0.204	0.44	0.48	0.57	0.258	0.18
SE(m)	--	0.114	0.117	0.13	0.069	0.15	0.16	0.19	0.087	0.061
SE(d)	--	0.161	0.166	0.18	0.097	0.21	0.23	0.27	0.123	0.086
C.V.	--	11.127	11.522	11.498	6.54	13.435	14.108	15.992	7.517	5.494

DAS: Days after spray. *Value in parenthesis are square root transformation values

Conclusion

The study on controlling aphids (*Aphis craccivora*) in mungbean (*Vigna radiata*) revealed that the combination of seed treatment with imidacloprid 600 FS at 5 ml/kg and thiamethoxam 25 WG at 0.3 ml/l was the most effective approach. This treatment significantly reduced aphid populations, with an overall mean count of 1.05 aphids per top 5 cm shoot, which was the lowest among all tested methods. Other treatments, such as combinations involving imidacloprid with spinosad or diafenthiuron, also performed well but were slightly less effective. The control group had the highest aphid counts, underscoring the importance of effective pest management strategies. These findings support the use of imidacloprid and thiamethoxam in Integrated Pest Management (IPM) for managing aphid infestations in mungbean crops.

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