International Journal of Environment and Climate Change

Volume 13, Issue 11, Page 2591-2596, 2023; Article no.IJECC.109095
ISSN: 2581-8627
(Past name: British Journal of Environment & Climate Change, Past ISSN: 2231–4784)

Evaluation of Insecticides against Cowpea Sucking Insect Pests in Madhya Pradesh's Gird Region

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Authors' contributions

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

Article Information

DOI: 10.9734/IJECC/2023/v13i113427

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/109095

Original Research Article

Received: 02/09/2023
Accepted: 07/11/2023
Published: 09/11/2023

ABSTRACT

During the *Kharif* season of 2022–2023 at Research Farm, Rajmata Vijyaraje Scindia Krishi Vishwa Vidyalaya, Gwalior, Madhya Pradesh, a field experiment was carried out to assess the effectiveness of seven treatments: T_1 - Dimethoate 30 EC (1000 ml); T_2 - Imidachloprid 17.8 SL (125 ml); T_3 - Acetamiprid 20 SP (125 gm); T_4 - Flubendiamide 48 SC (500 ml); T_5 – Emamectin benzoate 5 SG (100 gm); T_6 – Fipronil 15% SC (2000 ml); and T_7 - Un-treated. The observations were made three, seven, and fifteen days after the first and second pesticide sprayings, respectively. The data indicated that Imidachloprid 17.8 SL @ 125ml ha^{-1} was the most effective insecticide out of the six, and that it was better at controlling the incidence of sucking insects in cowpea, such as aphids (*Aphis craccivora* (Koch)), thrips (*M. distalis* (Karny)), whiteflies (*A. rachipora* (Singh)), and jassids (*E. kerri* (Pruthi)). However, it was found that Acetamiprid 20 SP was least successful in controlling sucking insects.

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Keywords: Aphid; thrips; whitefly; jassids; imidachloprid.

1. INTRODUCTION

One of the main tropical pulse crops, cowpea [*Vigna unguiculata* (Linn.) Walp] is also known as southern pea, black eyed bean, chala or choli, chavli and lobia. It is a member of the leguminaceae family. It may be utilised as a crop for green manure, a vegetable, a green legume, and fodder [1]. Cowpea seeds provide a rich source of proteins and calories, as well as minerals and vitamins. A seed can consist of 23-25% protein, 50-67% carbohydrates, 8-9% moisture and it has very low 3.99% fat content [2]. Cowpea is infected with 21 insect pests, including aphids, *Aphis craccivora* (Koch); leaf hoppers, *Empoasca kerri* (Pruthi); thrips, *Megaleurothrips distalis* (Karny); tobacco caterpillar, *Spodoptera litura* (Fab.), and spotted pod borer, *Maruca vitrata* (Geyer) which cause 65-100 percent losses.

The purpose of the study was to determine which insecticides were most effective against *A. rachipora*, *M. distalis*, *E. kerri*, and *A. craccivora* in the cowpea environment.

2. MATERIALS AND METHODS

The research farm, College of Agriculture, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior, Madhya Pradesh, India, was the site of the experiment. In Kharif 2021, a Randomised Block Design (RBD) system with three replications was implemented. Plot dimensions were 5.0 x 3.6 m^2. In each net plot area, five plants were randomly picked and tagged in order to record observations of insect-pest. Cowpea insect pest observations were made both before and after treatments. On five randomly chosen plants from each plot, pre-treatment observations were made 24 hours before to spraying, and post-treatment observations were made 3, 7, and 15 days following spraying. Then experimental data were subjected to statistical analysis using analysis of variance (ANOVA).

3. RESULTS AND DISCUSSION

3.1 Aphid, *Aphis craccivora* (Koch)

After the first spray of insecticide indicated in Table 1 that the population of aphid (*A. craccivora*) is decreased significantly at 3rd day and at 7th day of spray but started increasing at 15th day of spray. After first spray, Treatment T_2 (Imidachloprid 17.8 SL) was most significantly controlled aphid population at 3rd day (9.07 aphid/plant) and at 7th day (3.87 aphid/plant) in comparison to other treatments. The population to be found increasing at 15th day after first spray. After second spray, Treatment T_2 (Imidachloprid 17.8 SL) was again found most effective against aphid at 3rd day (4.95 aphid/plant) and at 7th day (1.10 aphid/plant) in comparison to other thretment. The population of aphid at 15th day after second spray found stable. The present findings supported by Srinivasan [3] studied that the efficacy of insecticide. The effective control of *M. vitrata* was manifested with the marked increase in yields. Saha et al. [4] reported that the newer insecticides in the field against insects pest. Panduranga et al. [5] reported that foliar spray of acetamprid 20 SP @ 0.002 per cent was found to be the least effective treatments. Iqbal et al. [6] conducted field study to evaluate one combination of treatment with imidacloprid. That showed a significant difference with one another, regarding their effectiveness.

3.2 Thrips, *Megalurothrips distalis* (Karny)

The population of thrips (*M. distalis*) was found to have greatly dropped on the third and seventh days following the pesticide treatment, but to have begun to increase on the fifteenth day following the application. Following the first and second sprays, Treatment T^2 (Imidachloprid 17.8 SL) was shown to have a considerable control over the population of thrips, followed by Acetamiprid 20 SP and Fipronil 15% SC. Conversely, it was shown that Flubendiamide 48 SC had the lowest efficacy against thrips. Present data that are consistent with Swarupa et al. (2019) conclusions. The current findings support those of Shobharani et al. [7], who found that imidacloprid 60 FS @ 10 ml / kg of seeds successfully decreased the number of sucking pests in the pulse field. According to Soundarajan and Chitra [8], the least amount of thrips was seen in pulses treated with imidachloprid.

3.3 Jassid, *Empoasca kerri* (Pruthi)

Table 3 displays the data collected on Jassid following the initial insecticide application in *Kharif*, 2022. Following the first and second

Table 1. Efficacy of various insecticides against aphid, *Aphis craccivora* (Koch) of cowpea in *Kharif* season

T/t	Treatment	First Spray				Second Spray			
		Pre spray (24 hours before)	3 Day after spray	7 Day after spray	15 Days after spray	Pre spray (24 hours before)	3 Day after spray	7 Day after spray	15 Days after spray
T_1	Dimethoate 30 EC	20.67	13.00	6.11	10.42	19.51	6.43	2.11	2.16
T_2	Imidachloprid 17.8 SL	19.67	9.07	3.87	9.95	18.50	4.95	1.10	1.07
T_3	Acetamiprid 20 SP	20.67	14.09	6.75	11.45	21.85	8.34	3.30	3.38
T_4	Flubendiamide 48 SC	20.67	10.11	5.53	9.08	19.15	7.14	2.31	2.14
T_5	Emamectin benzoate 5	19.33	12.75	7.33	13.75	17.55	7.65	3.04	3.07
T_6	Fipronil 15% SC	22.00	11.19	5.97	9.86	18.15	7.23	2.50	2.55
T_7	Un-treated	21.00	23.42	23.19	29.00	30.42	26.34	26.26	26.84
S.Em. ±		**1.187**	**2.251**	**1.921**	**2.329**	**1.742**	**0.934**	**1.700**	**1.427**
CD %		**NS**	**6.937**	**5.919**	**7.175**	**5.366**	**2.880**	**5.239**	**4.398**

Table 2. Efficacy of various insecticides against thrips, *M. distalis* (Karny) of cowpea in *Kharif* season

T/t	Treatment	First Spray				Second Spray			
		Pre spray (24 hours before)	3 Day after spray	7 Day after spray	15 Days after spray	Pre spray (24 hours before)	3 Day after spray	7 Day after spray	15 Days after spray
T_1	Dimethoate 30 EC	2.78	1.97	1.51	1.98	3.25	1.88	1.29	2.57
T_2	Imidachloprid 17.8 SL	2.76	1.58	0.92	1.19	2.87	1.35	0.9	1.88
T_3	Acetamiprid 20 SP	2.72	1.76	1.25	1.56	3.12	1.65	1.06	2.2
T_4	Flubendiamide 48 SC	2.73	2.12	1.77	2.21	3.38	2.63	2.22	3.56
T_5	Emamectin benzoate 5	2.74	1.89	1.37	1.81	3.15	1.77	1.21	2.45
T_6	Fipronil 15% SC	2.75	1.68	1.1	1.33	3.05	1.5	0.97	1.99
T_7	Un-treated	2.77	2.57	2.43	3.91	6.90	6.75	6.2	6.6
S.Em. ±		**0.03**	**0.04**	**0.04**	**0.06**	**0.10**	**0.07**	**0.07**	**0.13**
CD %		**NS**	**0.11**	**0.14**	**0.19**	**0.30**	**0.21**	**0.22**	**0.40**

Table 3. Efficacy of various insecticides against jassid, *E. kerri* (Pruthi) of cowpea in *Kharif* season

T/t	Treatment	First Spray				Second Spray			
		Pre spray (24 hours before)	3 Day after spray	7 Day after spray	15 Days after spray	Pre spray (24 hours before)	3 Day after spray	7 Day after spray	15 Days after spray
T_1	Dimethoate 30 EC	5.25	3.90	2.68	3.96	4.90	1.77	1.38	1.59
T_2	Imidachloprid 17.8 SL	5.27	3.75	2.25	3.62	4.75	1.43	1.11	1.30
T_3	Acetamiprid 20 SP	5.22	4.12	3.10	4.11	4.92	1.94	1.51	1.72
T_4	Flubendiamide 48 SC	5.21	4.87	4.14	4.99	5.10	2.36	2.44	2.21
T_5	Emamectin benzoate 5	5.20	4.52	3.85	4.52	5.23	2.12	1.90	1.85
T_6	Fipronil 15% SC	5.24	3.88	2.56	3.85	4.80	1.55	1.22	1.40
T_7	Un-treated	5.26	6.70	10.12	7.68	6.65	8.20	9.60	7.40
S.Em. ±		**0.15**	**0.11**	**0.17**	**0.23**	**0.18**	**0.09**	**0.07**	**0.09**
CD %		**NS**	**0.35**	**0.53**	**0.70**	**0.54**	**0.29**	**0.21**	**0.26**

Table 4. Efficacy of various insecticides against whitefly, *A. rachipora* (Singh) of cowpea in *Kharif* season

T/t	Treatment	First Spray				Second Spray			
		Pre spray (24 hours before)	3 Day after spray	7 Day after spray	15 Days after spray	Pre spray (24 hours before)	3 Day after spray	7 Day after spray	15 Days after spray
T_1	Dimethoate 30 EC	5.80	3.66	2.66	2.48	3.71	1.47	1.51	2.05
T_2	Imidachloprid 17.8 SL	5.77	3.33	2.12	1.97	3.45	1.10	1.09	1.63
T_3	Acetamiprid 20 SP	5.78	3.52	2.49	2.30	3.56	1.30	1.38	1.92
T_4	Flubendiamide 48 SC	5.81	3.99	3.15	2.83	3.78	2.34	2.22	2.61
T_5	Emamectin benzoate 5	5.79	3.79	2.87	2.55	3.82	2.21	1.90	2.37
T_6	Fipronil 15% SC	5.75	3.47	2.35	2.11	3.50	1.27	1.22	1.78
T_7	Un-treated	5.78	5.12	4.68	5.40	5.12	3.75	3.12	3.60
S.Em. ±		**0.23**	**0.13**	**0.10**	**0.08**	**0.09**	**0.06**	**0.07**	**0.10**
CD %		**NS**	**0.39**	**0.31**	**0.25**	**0.29**	**0.20**	**0.21**	**0.32**

sprays, treatment T_2 (Imidachloprid 17.8 SL) shown the lowest infestation compared to other treatments and was judged to have significantly suppressed the jassid population. On the jassid population, however, flubendiamide 48 SC was determined to be the least effective. The current results closely align with those of Singh et al. [9], Saini et al. [10], and Sarode et al. [11].

3.4 Whitefly, *Acaudaleyrodes rachipora* (Singh)

Treatment T2 (Imidachloprid 17.8 SL) was observed to considerably suppress the whitefly population after the first and second sprays, compared to other treatments. The least effective treatment against the population of whiteflies was determined to be flubendiamide 48 SC. Yadav et al. [12], Singh et al. [9], and Sharma et al. [13] previously published comparable findings [14,15].

4. CONCLUSION

Fipronil 15% SC and Acetamiprid 20 SP were shown to be the next most effective treatments, with treatment T_2 (Imidachloprid 17.8 SL) being proven to be much more effective against sucking insect pests. Conversely, it was shown that Flubendiamide 48 SC had the lowest efficacy against pest sucking insects.

ACKNOWLEDGEMENTS

The facilities for conducting this research were provided by the Head of the Department of Entomology at the College of Agriculture, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior, for which the authors are grateful.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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