

EVALUATION OF INSECTICIDES AGAINST COWPEA SUCKING INSECT PESTS IN MADHYA PRADESH'S GIRD REGION

ABSTRACT

During the *Kharif* season of 2022–2023 at Research Farm, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior, Madhya Pradesh, a field experiment was carried out to assess the effectiveness of seven treatments: T₁ - Dimethoate 30 EC (1000 ml); T₂ - Imidachloprid 17.8 SL (125 ml); T₃ - Acetamiprid 20 SP (125 gm); T₄ - Flubendiamide 48 SC (500 ml); T₅ – Emamectin benzoate 5 SG (100 gm); T₆ – Fipronil 15% SC (2000 ml); and T₇ - 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.

Keywords: Aphid, Thrips, Whitefly, Jassids, Imidachloprid

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 (Kumar *et al.*, 2017). 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 (Rangel *et al.*, 2003). 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.

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 m². 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).

RESULTS AND DISCUSSION

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 T₂ (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 T₂ (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 threatment. The population of aphid at 15th day after second spray found stable. The present findings supported by Srinivasan (2008) studied that the efficacy of insecticide. The effective control of *M. vitrata* was manifested with the marked increase in yields. Saha *et al.* (2009) reported that the newer insecticides in the field against insects pest. Panduranga *et al.* (2011) reported that foliar spray of acetamprid 20 SP @ 0.002 per cent was found to be the least effective treatments. Iqbal *et al.* (2013) conducted field study to evaluate one combination of treatment with imidacloprid. That showed a significant difference with one another, regarding their effectiveness.

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 T² (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.* (2017), 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 (2011), the least amount of thrips was seen in pulses treated with imidachloprid.

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 sprays, treatment T₂ (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.* (2018), Saini *et al.* (2023), and Sarode *et al.* (2003).

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.* (2015), Singh *et al.* (2018), and Sharma *et al.* (2019) previously published comparable findings.

CONCLUSION

Fipronil 15% SC and Acetamiprid 20 SP were shown to be the next most effective treatments, with treatment T₂ (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.

REFERENCES

- Bittenbender, H.C. (1990). Handling and storage of cowpea [*Vigna unguiculata* (L.) Walp.] as leaf vegetable. *Tropical Agriculture*, **69**:197-200.
- Iqbal, J.; Nadeem, M.; Assi, M.S.; Fiaz, M.M. and Hassan, M.W.U. (2013). Comparative efficacy of some insecticides against sucking insect pests on mungbean *Vigna radiata* (L.) Wilczek. *Gomal University Journal of Research*, **29**(1): 31-37.
- Kumar, A.; Sachan, S.K.; Kumar, S. and Kumar, P. (2017). Efficacy of some novel insecticides against white fly (*Bemisia tabaci* Gennadius) in brinjal. *Journal of Entomology and Zoology Studies*; **5**(3): 424-427.
- Panduranga, G.S. Vijayalakshmi, and Reddy, K.L. (2011). Evaluation of insecticides for management of *Bemisia tabaci* and MYMV disease in mungbean [*Vigna radiata* (L.) Wilczek]. *Annals of Plant Protection Science*, **19**(2): 295-298.
- Rangel, A.; Domont, G. B.; Pedrosa, C. and Ferreira, S. T. (2003). Functional properties of purified vicilins from Cowpea (*Vigna unguiculata*) and Pea (*Pisum sativum*) and Cowpea protein isolate. *Journal of Agricultural and Food Chemistry*, **51**: 5792–5797.
- Saha, T.; Patil, R.K.; Babalad, H.B. and Goud, K.B. (2009). Evaluation of insecticides against greengram pod borer, *Apion amplum* (Faust). *Karnataka Journal of Agricultural Sciences*, **22**(3): 637-639.
- Saidia, M.; Ngouajio, M.; Itulya, F. M. and Ehlers, J. (2007). Leaf harvesting initiation time and frequency affect biomass partitioning and yield of Cowpea. *Crop Science*, **47** (3): 1159-1166.
- Saini, A.; Kumar, R.; Mishra, S.K.; Mishra, A.K.; Tiwari, B. and Singh, S. (2023). Efficacy of novel insecticides against sucking insect pests of okra (*Abelmoschus esculentus* L. Moench). *The Pharma Innovation Journal*, **12**(7): 1451-1454.
- Sarode, S.V.; Dandle, H.G. and Pradnya, K. (2003). Influence of weather parameter on the incidence of major pests of rain fed cotton. Proceedings of the national symposium on frontier areas of entomology research, held at IARI (New Delhi), Entomological Society of India.
- Sharma, P.; Rana, B.S.; Mordia, A. and Kumawat, K. (2019). Seasonal incidence of sucking insect pests of cowpea, *Vigna unguiculata* [Linn] Walpers in relation to abiotic factors. *Journal of Entomology and Zoology Studies*, **7**(3): 1242-1244.
- Shobharani, M.; Sidramappa; Sunilkumar, N.M. (2017). Management of sucking pests of blackgram using seed treatment chemicals. *International Journal of Current Microbiology and Applied Sciences*. **6**(12): 3374- 3383.
- Singh, R.B.; Singh, G. and Nishad, R.N. (2018). Field evaluation of newer insecticides against white fly (*Bemisia tabaci*) in Kharif mungbean (*Vigna radiata* L.). *J. Pharmacogn Phytochem*, **7**(5): 811-812.
- Soundarajan RP, Chitra N. (2011). Effect of bioinoculants on sucking pests and pod borer complex in urdbean. *Journal of Biopesticides*, **4**(1): 7-11.
- Srinivasan, G. (2008). Bioefficacy of chemical and biorational insecticides against spotted pod borer, *Maruca vitrata* (Geyer) in short duration pigeonpea, *Pesticide Research Journal*, **20**(2): 221-223.

Yadav, K.S.; Pandya, H.V.; Patel, S.M.; Patel, S.D. And Saiyad, M.M. (2015). Population dynamics of major insect pests of cowpea [*Vigna unguiculata* (L.) Walp.]. *International Journal of Plant Protection*, **8**(1): 112-117.

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. \pm		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. \pm		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