

Short communication

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

ABSTRACT

A field experiment conducted at Research Farm, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior, Madhya Pradesh during *Kharif* season 2022-23 for the evaluation of the efficacy of 7 treatments viz., T₁ - Dimethoate 30 EC (1000 ml), T₂ - Imidachloprid 17.8 SL (125 ml), T₃ - Acetamiprid 20 SP (125 gm), T₄ - Flubendiamide 480 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 following the first and second insecticide sprayings. The results data showed that among the six insecticides, Imidachloprid 17.8 SL @ 125ml ha⁻¹ was the most effective, revealing to be better in controlling sucking insect like: Aphid [*Aphis craccivora*(Koch)], thrips [*M.distalis*(Karny)], whitefly [*A. rachipora*(Singh)] and jassid [*E. kerri*(Pruthi)] incidence in cowpea. While Acetamiprid 20 SP was found least effective against sucking insect pests.

Keywords: Cowpea, sucking pest and insecticide.

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). ~~In India, pulses occupied nearly 29.99 million hectares area with a production of 25.23 million tonnes during the year 2018-2019 (Anonymous, 2018).~~ 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.

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Comment [CS3]: Improve the abstract with information of methodology, evaluated parameters, results and conclusion.

The main objective of the research must be included in the abstract, and the benefits achieved with the main conclusion.

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The study aimed in order to find out the correlation of aphid, *A. craccivora*, jassid, *E. fabae*, whitefly, *B. tabaci* and its natural enemies in Cowpea ecosystem with the abiotic parameters. Suitable understanding of the seasonal incidence of sucking insect pests is important due to variation in the weather conditions and changing sucking insect pest scenario on the cowpea.

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MATERIALS AND METHODS

The experiment was carried out at the research farm, College of Agriculture, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior, Madhya Pradesh, India. Randomized Block Design (RBD) with 3 replications was deployed during *Kharif of* 2021. The plot size was 5.0 m X 3.6 m. For recording observations of insect-pest, five plants were randomly selected and tagged in each net plot area. The observations will be recorded at seven days after second spray. Observations on insect pests of cowpea will be recorded at pre and post treatments. Pre-treatment observations will be recorded at 24 hrs before spray and post treatment will be recorded at 7, 15, and 25 days after spraying on 5 plants selected randomly from each plot. Then experimental data were subjected to statistical analysis using analysis of variance (ANOVA).

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RESULTS AND DISCUSSION

Aphid, *Aphis craccivora* (Koch)

After the first spray of insecticide indicated in Table 2-1 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 found significantly controlled population at 3rd day (9.07 aphid/plant) and at 7th day (3.87 aphid/plant) in comparison to the un-treated population (23.42 and 23.19 at 3rd and 7th day, respectively). The population to be found increased at 15th day after first spray. After second spray, Treatment T₂ (Imidachloprid 17.8 SL) was found significantly controlled population at 3rd day (4.95 aphid/plant) and at 7th day (1.10 aphid/plant) in comparison to the un-treated population (26.34 and 26.34 at 3rd and 7th day, respectively). The population of aphid at 15th day after second spray found stable. The results for the objective evaluation of insecticides against aphid on cowpea crop are supported by Srinivasan

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(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 most effective treatments. Iqbal *et al.* (2013) conducted field study to evaluate one combination of seed treatment with imidacloprid. That results showed a significant difference with one another, regarding their effectiveness.

Jassid, *Empoasca kerri* (Pruthi)

The data recorded on Jassid after the first spray of insecticide during *Kharif of* 2022 presented in Table 2 indicated that the population of jassid (*E. kerri*) 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 found significantly controlled population at 3rd day (3.75 thrips/plant) and at 7th day (2.25 jassid/plant) at 15th day (3.62 jassid/plant) in comparison to the un-treated population (6.70, 10.12 and 7.68 jassid/plant at 3rd day, 7th day and 15th day, respectively). After second spray, treatment T₂(Imidachloprid 17.8 SL) was found significantly controlled population at 3rd day (1.43 jassid/plant), 7th day (1.11 jassid/plant) and 15th day (1.30 jassid/plant) in comparison to the un-treated population (6.75 and 6.20 at 3rd and 7th day, respectively). The population of aphid at 15th day after second spray found stable. The Jassid population showed positive significant correlation with temperature, while negative correlation with rainfall and humidity. These findings are in close agreement with Sarode *et al.* (2003) observed that Jassids population was found to be significantly influenced by the minimum temperature and morning relative humidity (RH). These results were supported by Singh *et al.* (2018) and Saini *et al.* (2023).

Thrips, *Megalurothrips distalis* (Karny)

Observation after the first spray of insecticide indicated that the population of thrips (*M. distalis*) is decreased significantly at 3rd day and at 7th day (Table 3) of spray but started increasing at 15th day of spray. After first spray, Treatment T₂(Imidachloprid 17.8 SL) was found significantly controlled population at 3rd day (1.58 thrips/plant) and at 7th day (0.92 thrips/plant) at

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15th day (1.19 thrips/plant) in comparison to the un-treated population (2.57 and 2.43 thrips/plant at 3rd day and 7th day, respectively). The population ~~to be found~~ ~~increasing~~ at 15th day after first spray. After second spray, Treatment T₂(Imidachloprid 17.8 SL) was found significantly controlled population at 3rd day (1.65 thrips/plant) and at 7th day (1.06 thrips/plant) in comparison to the un-treated population (6.75 and 6.20 at 3rd and 7th day, respectively). The population of ~~aphid~~ at 15th day after second spray found stable. The results for the objective evaluation of insecticides against thrips on cowpea crop are supported by Swarupa *et al.* (2019) ~~→~~ conducted to test the efficacy of seed treatment chemicals against sucking pests *viz.*, thrips infesting cowpea. The effective management of thrips showed lowest thrips population. The present results are in accordance with the results of Shobharani *et al.* (2017) who reported that imidacloprid 60 FS @ 10 ml / kg of seeds effectively reduced the sucking pest population in the blackgram field. Soundarajan and Chitra (2011) reported that seed treatment with imidacloprid recorded the lowest incidence of the sucking pests in blackgram.

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Whitefly, *Acaudaleyrodes rachipora* (Singh)

The data presented after the first spray of insecticide indicated in ~~Table 4~~ revealed that the population of whitefly (*A. rachipora*) 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 found significantly controlled population at 3rd day (3.33 whitefly/plant) and at 7th day (2.12 whitefly/plant) at 15th day (1.97 whitefly/plant) in comparison to the un-treated population (5.12 and 4.68 thrips/plant at 3rd day and 7th day, respectively). The population ~~to be found~~ ~~increasing~~ ~~increased~~ at 15th day after first spray. After second spray, Treatment T₂(Imidachloprid 17.8 SL) was found significantly controlled population at 3rd day (1.10 whitefly/plant) and at 7th day (1.09 whitefly/plant) in comparison to the un-treated population (3.75 and 3.12 at 3rd and 7th day, respectively). The population of aphid at 15th day after second spray found stable. These similar results were earlier reported by Yadav *et al.* (2015), imidacloprid was found more effective (1.14 jassid/6 leaves) in control of whitefly by Singh *et al.* (2018) and Sharma *et al.* (2019).

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CONCLUSION

From the results, it was concluded that treatment T₂ (Imidachloprid 17.8 SL) was found significantly more effective at 3rd, 7th and 15th day after two sprays. It was concluded that Imidachloprid 17.8 SL @ 125ml was found to be better in controlling Aphid [*Aphis craccivora*(Koch)], thrips [*M.distalis*(Karny)], whitefly [*A. rachipora*(Singh)] and jassid [*E. kerri*(Pruthi)] incidence in cowpea.

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Remember to the main objectives of the research and the benefits for the society.

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REFERENCES

- Anonymous. (2018). Posted Economics, Genetics Crop India II PR English Production and Productivity, Pulse Development Scheme, ZPD, Kanpur .
- 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, *Apionamplum* (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 Kharifmungbean (*Vigna radiata* L.). *J. PharmacognPhytochem*, **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 480 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 32: 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 480 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

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Table 32: Efficacy of various insecticides against jassid, *E. kerri* (Pruthi) of cowpea in Kharif season.**Comment [CS15]:** Correct the order of the Tables.**Formatted:** Font color: Red

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 480 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 480 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