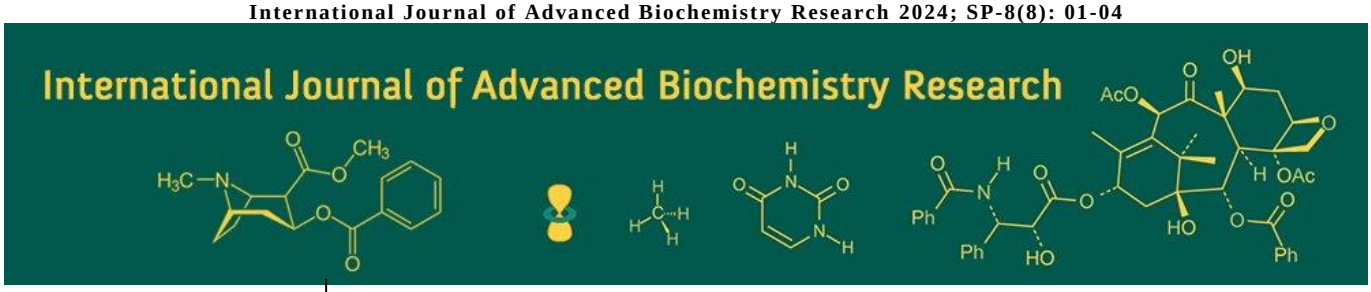

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Field evaluation of selected insecticides against chilli thrips *Scirtothrips dorsalis* (Hood)

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Abstract
A field experiment was conducted at Central Research Farm (CRF), Department of Entomology, Sam Higginbottom University of Agriculture, Technology, and Sciences. Prayagraj, Uttar Pradesh, during *Rabi* season 2023–24. The experiment was carried out in a randomized block design (RBD) with three replications and eight treatments. The precount populations were recorded one day before spraying, while the post-treatment observations were recorded 3, 7, and 14 days after each spraying. Two sprays of standard doses of Fipronil 5% SC @ 1 ml/lit, Imidacloprid 17.8% SL @ 0.5 ml/lit, Spinosad 45% SC @ 0.3 ml/lit, Broflanilide 20 SC @ 0.25 ml/lit, Acetamiprid 20% SP @ 4 gm/lit, *Beauveria Bassiana* 2×10^8 CFU/ml @ 5 ml/lit, Neem oil 1500 ppm @ 2.5 ml/lit, and untreated control were evaluated against chilli thrips. The mean of both sprays revealed that Broflanilide 20 SC @ (0.49) proved to be the most effective treatment, followed by Imidacloprid 17.8 SC @ (0.77), Spinosad 45 SC @ (0.92), Fipronil 5 SC @ (1.21), Acetamiprid 20 SP @ (1.60), *Beauveria Bassiana* 2×10^8 CFU/ml @ (2.11), and Neem oil 1500 ppm @ (2.36). The crop yield ranged between broflanilide (128 q/ha) and neem oil (48) as compared to the untreated control (28 q/ha). CBR ranged from broflanilid (1:8.16) to neem oil (1:2.44) as compared to the untreated control (1.1.04).

Keywords: *Capsicum annum*, cost–benefit ratio, efficacy, insecticides, *Scirtothrips dorsali*, yield

Introduction
Chilli (*Capsicum annuum* L.) is one of the important vegetable and condiment crops grown throughout the year in India. It is also known as the 'hot pepper', 'red pepper', "etc. Chilli belongs to the Solanaceae family Siddesha *et al.*, (2021) [17]. Chilli is considered one of the most important commercial spice and vegetable crops in India. It is a widely used universal spice and is named "wonder spice" by Muralimohan *et al*., (2023) [11].

The primary center of origin of chili is said to be Mexico, with a secondary center in Guatemala and Bulgaria. Chilli, a crop of tropical and subtropical regions, requires a warm, humid climate.

It has a high amount of vitamin C and other vitamins such as vitamin A, E, and B-complex groups of vitamins such as thiamin (vitamin B1), riboflavin (vitamin B2), niacin (vitamin B3), and pyridoxine (vitamin B6). Swamy. (2023) [18].

World acreage, either for green or ripe-dry fruits, is not available separately. Major chilli-growing countries are India, China, Indonesia, Nigeria, and Ghana. The world acreage under the green chili crop varies around 1001 thousand hectares, with a production of 8740 thousand tons and an average production of 8732 kg per hectare. Anonymous. (2020) [2]. The global area under chili cultivation is 1.776 million ha, with a production of 7.182 million tonnes. Gade *et al*., (2020) [8].

In India, chilli was grown on an area of 418 lakh ha with an annual production of 45.05 million tonnes and an average productivity of 11 mt/ha in the years 2021–2022. In India, the green chilli producing area is 418 ha and production is 4505 MT, and the dried chilli producing area is 852 ha and production is 1578 MT. Department of Agriculture and Farmers Welfare. (2021–2022) [7].

The important chilli-growing states are in Andhra Pradesh. Guntur city is called the 'Chilli city' of India. Guntur district in Andhra Pradesh alone produces 15% of all the chillies produced in India, and the state of Andhra Pradesh as a whole contributes 26% of India's chilli production Anonymous. (2022) [3].

The thrips were first collected by Ramakrishna Ayyar on shoots and fruit of chilli in Coimbatore (India) in 1916 and sent to Hood, who described it as a new species in 1919 under the name *Scirtothrips dorsalis* (Hood) Ayyar et al., (1935) [4]. Since then, there has been no nomenclature change for this insect. It has been called thrips.

The important pests are thrips (*Scirtothrips dorsalis* Hood), white mites, *Polyphagotarsonemus latus* (Banks), aphids, *Aphis gossypii* Glover, and *Myzus persicae*. Sulzer as sucking complex, tobacco caterpillar *Spodoptera litura* (Fabricius), and pod borer *Helicoverpa armigera* (Hubner) as pod borer. Rao and Ahmed. (1985) [15]. Chilli thrips, *Scirtothrips dorsalis* (Hood) (Thysanoptera: Thripidae), is a serious pest of *Capsicum annuum* L. in India, responsible for leaf curling. Ananthakrishnan. (1971) [1]. It multiplies appreciably at a faster rate during dry weather periods, and the yield loss caused by the thrips is reported to range from 30 to 90%. Borah. (1987) [5]. and Varadharajan. (1994) [20].

The losses caused by various pests to the chilli crop can be avoided by adopting proper pest control tactics. Insecticide application is one of the management options that can substantially reduce yield losses associated with insect pest infestations. There are a number of insecticides available to control these pests. Foliar applications of systemic insecticides have been found to be more effective than soil drenches in controlling chili thrips. To generate information regarding efficacy. The insecticide gives instant relief to the crop from pests. Chemicals are also a part of integrated pest management and are applied when the population of pests reaches ETL.

Methodology

The present investigation, entitled "Field evaluation of various insecticides against chilli thrips *Scirtothrips dorsalis* (Hood) during *Rabi* season 2023-2024," was carried out at Central Research Farm (CRF), Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj, during the *Rabi* season of 2023–24. The experiment was conducted in Randomized Block Design (RBD) with three replications and eight treatments. Variety G4 (Bhagya Lakshmi) in a plot size of 2 m × 1 m at a spacing of 45 cm × 30 cm with a recommended package of practices excluding plant protection.

The experiment consists of three replications and eight insecticides, i.e., (T_1) Fipronil 5% SC @ 1 ml/lit, (T_2) Imidacloprid 17.8% SL @ 0.5 ml/lit, (T_3) Spinosad 45% SC @ 0.3 ml/lit, (T_4) Broflanilide 20 SC @ 0.25 ml/lit, (T_5) Acetamiprid 20% SP @ 4 g/lit, (T_6) *Beauveria bassiana* 2×10^8 CFU/ml @ 5 ml/lit, (T_7) Neem oil, 1500 ppm at 2.5 ml/lit, and untreated control (T_0) were evaluated. All the insecticides were applied as a foliar spray with the help of a hand sprayer (5-liter capacity). Spraying The quantity of spray suspension required for each treatment was calibrated by spraying water over three plots in the experiment prior to the application of insecticides. Spray suspensions of the desired strength of each insecticide were prepared against thrips in the field. The insecticides were sprayed twice. The first spray of each insecticide was applied when incidence was noticed, while the remaining sprays were given at an interval of 14 days with a manual hand sprayer.

Materials and Methods

Observations on the number of thrips were recorded on five randomly selected plants per plot. A number of thrips were recorded from the three leaves at the top, middle, and bottom of the plant. The pre-treatment observations were recorded a day before the application of the insecticide, and subsequently, post-treatment observations were recorded on the second, third, and fourteenth days after each spray in the early morning hours.

The data on the thrips population was statistically analyzed for testing the significance of the treatment effect, and the interpretation of the data was done by using the critical difference value calculated at the 0.05 probability level. The level of significance was expressed at 0.05 probability (Gomez and Gomez, 1976) [9]. Finally, yield was recorded for every treatment to calculate the cost-benefit ratio.

Results and Discussion

First spray the data on the mean population of thrips prior to insecticide application ranged from 8.00 to 9.00 per three leaves per plant. There was no significant difference among the different treatments since there was a there was a uniform distribution of thrips in different treatments.

The results (Table 1) after the 1st and 2nd sprays revealed that all the treatments were significantly superior to the control. The data on the mean population of chilli thrips, *Scirtothrips dorsalis* (Hood), 3rd, 7th, and 14th days after the first spray revealed that all the insecticide treatments were significantly superior to control. Among all the treatments, the minimum mean population of thrips was recorded in Broflanilid 20% SC (0.25 ml/lit) (0.60), followed by Imidacloprid 17.8% SL 0.5 ml/lit (0.80), Spinosad 45% SC 0.3 ml/lit (0.98), Fipronil 5% SC 1ml/lit (1.31), Acetamiprid 20% SP 4gm/lit (1.89), *Beauveria bassiana* $2x10^8$ CFU/ml 5 ml/lit (2.20), and Neem oil 1500 ppm 2.5 ml/lit (2.49), which was least effective among all the treatments and control plot (9.09).

The data on the mean population of chilli thrips, *Scirtothrips dorsalis* (Hood), 3rd, 7th, and 14th days after the second spray revealed that all the insecticide treatments were significantly superior to control. Among all the treatments, Broflanilid 20% SC (0.25 ml/lit) recorded the minimum mean population of thrips *Scirtothrips dorsalis* (Hood), i.e., 0.38, followed by Imidacloprid 17.8% SL 0.5 ml/lit (0.73), Spinosad 45% SC 0.3 ml/lit (0.87), Fipronil 5% SC 1ml/lit (1.11), Acetamiprid 20% SP 4gm/lit (1.31), *Beauveria bassiana* 2×10^8 CFU/ml 5 ml/lit (2.02), and Neem oil 1500 ppm 2.5 ml/lit (2.22) was least effective among all the treatments and control plot (12.98).

The highest yield and cost-benefit ratio was recorded in Chlorantraniliprole 18.5% SC (295 q/ha), (1:4.40), Broflanilid 20% SC (128 q/ha), (1:8.16), followed by Imidacloprid 17.8% SL (112), (1:7.14), Spinosad 45% SC (108), (1:6.81), Fipronil 5% SC (98), (1:6.12), Acetamiprid 20% SP (82), (1:4.95), *Beauveria bassiana* $2x10^8$ CFU/ml (56), (1:3.04), and Neem oil 1500 ppm (48), (1:2.44) as compared to control (28) (1:1.04).

Table 1: Assessment of insecticide against chilli thrips *Scirtothrips dorsalis* (Hood) during *Rabi* season 2023-2024.

Sl. No.	Treatments	DBS	Population of *Scirtothrips dorsalis* (Hood) / 3 leaves								Over all mean	Yield (q/ha)	C: B Ratio
			1st spray				2nd spray						
			3DAS	7DAS	14DAS	Mean	3DAS	7DAS	14DAS	Mean			
T_0	Control	8.20	8.60^{a}	8.80^{a}	9.87^{a}	9.09^{a}	12.07^{a}	12.87^{a}	14.00^{a}	12.98^{a}	10.83^{a}	28.00	1:1.0
T_1	Fipronil 5%SC	8.67	1.40^{d}	1.20^{d}	1.33^{d}	1.31^{d}	1.13^{de}	0.93^{c}	1.27^{cd}	1.11^{cd}	1.21^{b}	98.00	1:6.1
T_2	Imidacloprid 17.8%SL	8.00	0.93^{ef}	0.60^{e}	0.87^{ef}	0.80^{e}	0.73^{de}	0.53^{cd}	0.93^{d}	0.73^{de}	0.77^{b}	112.00	1:7.1
T_3	Spinosad 45%SC	8.47	1.13^{de}	0.73^{e}	1.07^{de}	0.97^{de}	0.93^{de}	0.67^{cd}	1.00^{cd}	0.87^{cde}	0.92^{b}	108.00	1:6.8
T_4	Broflanilid 20% SC	8.67	0.73^{f}	0.47^{e}	0.60^{f}	0.60^{e}	0.47^{e}	0.27^{d}	0.40^{e}	0.38^{e}	0.49^{b}	128.00	1:8.2
T_5	Acetamiprid 20% SP	9.07	1.80^{c}	1.67^{c}	2.20^{c}	1.89^{c}	1.33^{cd}	1.13^{c}	1.47^{c}	1.31^{c}	1.60^{b}	82.00	1:4.9
T_6	*Beauveria bassiana* $2x10^8$ CFU/ml	8.53	2.20^{b}	1.93^{bc}	2.47^{bc}	2.20^{bc}	2.00^{bc}	1.87^{b}	2.20^{b}	2.02^{b}	2.11^{b}	56.00	1:3.0
T_7	Neem oil 1500 ppm	9.00	2.47^{b}	2.27^{b}	2.73^{b}	2.49^{b}	2.13^{b}	2.07^{b}	2.47^{b}	2.22^{b}	2.36^{b}	48.00	1:2.4
	F- test	NS	S	S	S	S	S	S	S	S	S		
	S.Ed(±)	0.268	0.103	0.120	0.109	0.137	0.248	0.216	0.161	0.186	0.733		
	C.D. (P=0.05)	NS	0.312	0.363	0.330	0.417	0.753	0.655	0.487	0.564	2.451		

DBS- Day Before Spraying, DAS- Day After Spraying, S- Significant

The data on the overall mean population of chilli thrips, *Scirtothrips dorsalis* (Hood), after first and second sprays in Broflanilid 20% SC was more effective in controlling the thrips population, with the mean (0.49) over control. These results are supported by Muralimohan *et al*., (2023) [11]. Imidacloprid (17.8% SL) was also found to be effective (0.77), as observed by Sangle *et al*., (2017) [16], and Spinosad 45% SC was also found to be effective (0.92). Similar findings were observed by Choudhary *et al.* (2022) [6] and Vanisree *et al.,* (2017) [19].

The cost-benefit ratio ranged between (1:8.16) and (1:1.04). The maximum cost-benefit ratio (1:8.16) and yield (128 q/ha) were obtained in Broflanilid 20% SC. Treated plot, which is supported by the findings of Mandal and Mondal (2022) [10], followed by Imidacloprid 17.8% SL with a cost-benefit ratio of 1:7.14 and yield of 112 q/ha, and the results were like the findings of Penumada *et al.,* (2020) [14]. Spinosad 45% SC had a cost-benefit ratio of 1:6.81 and 108 q/ha, and the results were similar to those of Zanwar *et al.,* (2022) [21].

Conclusion

The present investigation was conducted, Broflanilid 20% 0.25 ml/lit SC was found to be the most effective treatment and that minimum mean (0.49) population of *Scirtothrips dosrsalis* (Hood) on chilli, followed by Imidacloprid 17.8%SL 0.5 ml/lit (0.77), Spinosad 45%SC 0.3 ml/lit (0.92), Fipronil 5%SC 1ml/lit (1.21), Acetamiprid 20% SP 0.4gm/lit (1.60), Beauveria bassiana 2×108 5 ml/lit (2.11) and Neem oil 1500ppm 2.5 ml/lit (2.36) to compared to untreated control. It was effective in controlling chilli thrips population, followed by being effective in managing the *Scirtothrips dorsalis* (Hood). The recommended dose of chemicals may be useful in devising an integrated pest management strategy against chilli thrips.

References

1. Ananthakrishnan TN. Thrips (Thysanoptera) in agriculture, horticulture, forestry - Diagnosis, bionomics and control. J Sci Ind Res. 1971;30:113-146.
2. Anonymous. Acharya N.G. Ranga Agricultural University Crop Outlook Reports of Andhra Pradesh CHILLI – January to December 2022; c2022. Available from: https://angrau.ac.in/AMIC/OutlookReports/2022
3. Anonymous; c2020. Retrieved from: http://www.ikisan.com. [cited 2021 Jun 5].
4. Ayyar RTV, Subbiah MS. The leaf curl disease of chilies caused by thrips in the Guntur and Madura tracks. Madras Agric J. 1935;23:403-410.
5. Borah DC. Biology of *Polyphagotarsonemus latus* (Banks) (Acari: Tarsonemidae) and *Scirtothrips dorsalis* (Thysanoptera: Thripidae) infesting chilli and their natural enemies. Ph.D. Thesis, University of Agricultural Sciences, Dharwad, Karnataka; c1987. [dissertation].
6. Choudhary JS, Monobrullah MD, Kumar R, Kumar DR, Singh AK. Field efficacy of insecticides against chilli thrips (*Scirtothrips dorsalis*) and their effect on coccinellids. Indian J Agric Sci. 2022;92(10):1196-1201.
7. Department of Agriculture & Farmers Welfare. Agricultural Statistics at a Glance; c2021. Available from: https://agriwelfare.gov.in
8. Gade PA, More SS, Shelke RD, Nalegaonkar AR. Growth and instability in area, production and yield of chilli in India. Int J Curr Microbiol Appl Sci. 2020;9(11):2647-2654.
9. Gomez KS, Gomez AA. Statistical procedures for agricultural research. New York: John Wiley & Sons; c1984. p. 680.
10. Mandal L, Mondal P. Bioefficacy of some newer generation insecticides against chilli thrips, *Scirtothrips dorsalis* Hood. Int J Bio-resource Stress Manage. 2022;13(11):1130-1140.
11. Muralimohan K, Anandmurthy T, Kumar DNT, Shivanna B, Archana BR. Bio-efficacy of novel insecticides and biorationals against invasive thrips, *Thrips parvispinus* (Karny) (Thripidae: Thysanoptera) on chilli. Pest Manag Hortic Ecosyst. 2023;29(1):97-101.
12. Nayak US, Soni VK, Senapati S. Comparative efficacy of certain insecticides against thrips (*Scirtothrips dorsalis* H.) and aphids (*Aphis gossypii* G.) on chilli. J Plant Protect Environ. 2014;11(1):44-48.
13. Patel BH, Koshiya DJ, Korat DM. Population dynamics of chilli thrips, *Scirtothrips dorsalis* (Hood) in relation to weather parameters. Karnataka J Agric Sci. 2009;22(1):108-4110.
14. Penumada SB, Kumar A, Byri CR, Pittala V. Population dynamics and efficacy of selected insecticides against chilli thrips, *Scirtothrips dorsalis* (Hood) in Kharif. J Entomol Zool Stud. 2020;9(1):1225-1228.

15. Rao D, Ahmed K. Evaluation of certain insecticides for the control of the pest complex on chilli in Andhra Pradesh. Pesticides. 1985;19(2):41-44.
16. Sangle PM, Pawar SR, Mithu A, Korat DM. Bio-efficacy studies of newer insecticides against sucking insect pests on chilli (*Capsicum annuum* L.). J Entomol Zool Stud. 2017;5(6):476-480.
17. Siddesha M, Patil CS, Saindane YS. Efficacy of insecticides and some bio-rationals against thrips and mites on chilli (*Capsicum annuum* L). India J Pharmacogn Phytochem. 2021;10(1):1812-1816.
18. Swamy KRM. Origin, distribution, taxonomy, botanical description, genetic diversity and breeding of capsicum (*Capsicum annuum* L.). Int J Dev Res. 2023;13(3):61956-61977.
19. Vanisree K, Upendhar S, Rajasekhar P, Rao GR. Effect of newer insecticides against chilli thrips, *Scirtothrips dorsalis* (Hood). J Entomol Zool Stud. 2017;5(2):277-284.
20. Varadharajan S. Studies on host plant resistance and biology of chilli thrips, *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae). MSc (Ag) Thesis, Annamalai University, Annamalainagar. [dissertation].
21. Zanwar PR, Matre YB, Baral SB. Bio-efficacy of new insecticides against sucking pests of chilli. J Appl Entomol. 2022;2(3):20-28.