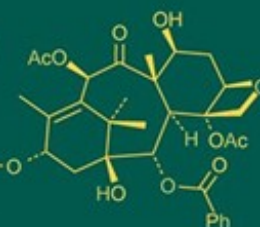


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Eco-friendly management of thrips (*Scirtothrips dorsalis*) infesting chilli

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ABSTRACT

The field experiment was conducted during Kharif 2025 to evaluate the efficacy of selected microbial, botanical and chemical treatments against chilli thrips, *Scirtothrips dorsalis* under field conditions. The treatments included entomopathogenic fungi, botanical formulations and selected insecticides and were evaluated after successive sprays. Thrips population was recorded on three leaves at 3, 5, 7, 10 and 14 days after spray (DAS), along with an observation before spraying. After the first spray, Acetamiprid 20 SP @ 0.25 g/L recorded the lowest mean thrips population of 4.20 thrips per three leaves, whereas the untreated control recorded 10.72 thrips per three leaves. After the second spray, Fipronil 5% SC @ 2 ml/L recorded a mean population of 3.35 thrips per three leaves, while *Metarhizium anisopliae* was the most effective among the microbial treatments with 4.95 thrips per three leaves. After the third spray, Spinosad 45 SC @ 0.4 ml/L recorded a mean population of 2.73 thrips per three leaves, while *Metarhizium anisopliae* recorded 4.63 thrips per three leaves among the eco-friendly treatments. The results indicated differential efficacy of the tested treatments and demonstrated the potential of microbial and botanical products as components of integrated pest management.

Keywords: Chilli, *Scirtothrips dorsalis*, Thrips, Biorational management, Biopesticides, Botanicals, Integrated pest management

Introduction

Chilli (*Capsicum annuum* L.) is an important vegetable and spice crop widely cultivated in India. India is one of the largest producers, consumers and exporters of chilli, contributing about 40% of world chilli production. Andhra Pradesh is the leading chilli-producing state, followed by Telangana, Karnataka, Odisha and West Bengal. Maharashtra is also an important chilli-producing state, with major production in districts such as Sangli, Kolhapur, Solapur, Nanded and Nandurbar. Chilli crop is attacked by several insect pests, and about 55 insect and non-insect pests have been reported. Major pests include thrips (*Scirtothrips dorsalis*), whitefly (*Bemisia tabaci*), aphid (*Aphis gossypii*), jassid and fruit borer. Among these, thrips is one of the major sucking pests and can cause yield losses of about 30–50%. Thrips feed on tender leaves, shoots, flowers and fruits, causing leaf curling, crinkling and poor plant growth.

Materials and Method

The experiment was conducted during *kharif* 2025, on farm of Department of Entomology, College of Agriculture, Badnapur, district Jalna, to evaluate ecofriendly treatments against major insect pests of green chilli with special emphasis on thrips to check viral infection through biorational approach. The experimental field was cleaned manually and levelled with the help of ploughing followed by harrowing. The field experiment was laid in RBD design with the seven treatments replicated three times. The seedling of the green chilli variety Teja-4 was sown adopting the spacing 60x45 cm in beds with ridges and furrows adopting all the recommended package of practices. The treatments were imposed following the ETL of thrips and other major pests followed by 15 days interval.

Experimental details

1	Design	RBD
2	Treatments	07
3	Replication	03
4	Spacing	60 x 45 cm
5	Gross plot size	3.6 x 3.15 m
6	Net plot size	2.4 x 2. 25m
7	Variety	Teja-4
8	Season	kharif

Table 2. Treatment Details

Sr. No	Treatment	First Spray	Second spray	Third spray
1	T_1	<i>Lecanicillium lecanii</i> 2×10 ⁸ cfu @ 4 ml/L	<i>Metarhizium anisopliae</i> 2×10 ⁸ cfu @ 4 ml/L	NSKE 5%
2	T_2	<i>Beauveria bassiana</i> 2×10 ⁸ cfu @ 4 ml/L	NSKE 5%	<i>Metarhizium anisopliae</i> 2×10 ⁸ cfu @ 4 ml/L
3	T_3	<i>Metarhizium anisopliae</i> @ 3 ml/L	<i>Lecanicillium lecanii</i> 2×10 ⁸ cfu @4 ml/L	<i>Beauveria bassiana</i> 2×10 ⁸ cfu @ 4 ml/L
4	T_4	NSKE 5%	Castor oil (10 ml /L)	<i>Pongamia</i> oil (10 ml/L)
5	T_5	Castor oil (10 ml /L)	<i>Pongamia</i> oil (10 ml/L)	Neem oil (5 ml/ L)
6	T_6	Acetamiprid 20SP@ 0.25g/L	Fipronil 5% SC@ 2 ml/L	Spinosad 45 SC@ 0.4 ml/L
7	T_7	Untreated control	Untreated control	Untreated control

Method of observations

With the help of magnifying glass, the number of nymphs and adults of thrips was recorded from bottom, middle and top leaves of five randomly selected plants of each plot. The percent suppression in

population will also be worked out at 14th day after each spraying. The observations will be recorded one day before and 3, 7, 10 and 14 days after spraying.

Table 2. Effect of different treatments against chilli thrips after spray.

Tr. No.	First Spray							Second Spray							Third Spray						
	1	3	5	7	10	14	Mean	3	5	7	10	14	Mean	3	5	7	10	14	Mean		
	DBS	DAS	DAS	DAS	DAS	DAS		DAS	DAS	DAS	DAS	DAS		DAS	DAS	DAS	DAS	DAS			
T ₁	8.94 (3.07)	5.42 (2.43)	5.12 (2.38)	4.80 (2.31)	4.42 (2.22)	6.18 (2.58)	5.81 (2.50)	5.18 (2.38)	4.90 (2.32)	4.55 (2.25)	4.12 (2.15)	6.02 (2.54)	4.95 (2.33)	5.12 (2.37)	4.82 (2.31)	4.48 (2.24)	4.18 (2.16)	5.95 (2.53)	4.91 (2.32)		
T ₂	8.88 (3.06)	5.58 (2.46)	5.28 (2.40)	4.98 (2.35)	4.58 (2.25)	6.34 (2.61)	5.94 (2.52)	5.42 (2.43)	5.05 (2.36)	4.78 (2.30)	4.42 (2.22)	6.22 (2.59)	5.18 (2.38)	4.82 (2.31)	4.52 (2.24)	4.20 (2.17)	3.88 (2.09)	5.72 (2.48)	4.63 (2.26)		
T ₃	8.96 (3.08)	5.74 (2.50)	5.42 (2.43)	5.10 (2.37)	4.72 (2.29)	6.46 (2.63)	6.07 (2.55)	5.56 (2.46)	5.20 (2.39)	4.88 (2.32)	4.55 (2.25)	6.34 (2.61)	5.31 (2.41)	5.00 (2.35)	4.72 (2.29)	4.42 (2.22)	4.08 (2.14)	5.88 (2.52)	4.82 (2.30)		
T ₄	9.02 (3.09)	5.96 (2.55)	5.66 (2.49)	5.32 (2.41)	4.92 (2.33)	6.68 (2.67)	6.26 (2.59)	5.82 (2.52)	5.45 (2.44)	5.10 (2.37)	4.78 (2.30)	6.52 (2.64)	5.53 (2.45)	5.70 (2.50)	5.38 (2.43)	5.02 (2.35)	4.70 (2.28)	6.42 (2.63)	5.44 (2.44)		
T ₅	9.08 (3.10)	6.20 (2.60)	5.88 (2.53)	5.56 (2.46)	5.12 (2.38)	6.90 (2.71)	6.46 (2.63)	5.98 (2.55)	5.63 (2.48)	5.28 (2.40)	4.93 (2.33)	6.70 (2.68)	5.70 (2.49)	5.48 (2.45)	5.18 (2.39)	4.82 (2.31)	4.48 (2.24)	6.22 (2.59)	5.24 (2.40)		
T ₆	8.90 (3.07)	3.52 (2.00)	3.20 (1.92)	2.82 (1.82)	2.18 (1.64)	4.56 (2.24)	4.20 (2.12)	3.68 (2.05)	3.40 (1.97)	2.88 (1.84)	2.18 (1.64)	4.62 (2.26)	3.35 (1.95)	2.98 (1.87)	2.60 (1.76)	2.22 (1.65)	1.82 (1.52)	4.02 (2.12)	2.73 (1.79)		
T ₇	8.98 (3.08)	12.84 (3.66)	12.18 (3.57)	10.62 (3.33)	10.04 (3.24)	9.68 (3.18)	10.72 (3.34)	13.08 (3.68)	12.52 (3.61)	10.76 (3.36)	10.18 (3.27)	9.82 (3.21)	11.27 (3.43)	13.42 (3.73)	12.88 (3.66)	11.16 (3.42)	10.58 (3.34)	10.10 (3.25)	11.63 (3.48)		
SE ±	0.08	0.05	0.05	0.04	0.05	0.08	0.06	0.05	0.05	0.04	0.05	0.08	0.05	0.05	0.05	0.04	0.05	0.08	0.05		
CD at 5%	NS	0.16	0.15	0.14	0.15	0.25	0.19	0.16	0.15	0.14	0.15	0.25	0.17	0.16	0.15	0.14	0.15	0.25	0.17		
CV (%)	12.02	11.48	11.86	12.21	11.73	12.54	11.97	11.36	11.74	12.08	11.58	12.81	11.91	11.52	11.84	12.27	11.76	12.61	11.98		

Figures in paranthesis are $\sqrt{x} + 0.5$ transformed values., DAS: Days after sowing

First spray application

Based on the overall mean thrips population (including 1 DBS and all post-treatment observations), Acetamiprid 20 SP (T_6) emerged as the most effective treatment with a mean population of 4.20 thrips per three leaves. Among the eco-friendly treatments, *Lecanicillium lecanii* (T_1) proved to be the most effective microbial treatment with a mean of 5.81 thrips per three leaves, followed by *Beauveria bassiana* (T_2) (5.94 thrips), *Metarhizium anisopliae* (T_3) (6.07 thrips), NSKE 5% (T_4) (6.26 thrips) and Castor oil (T_5) (6.46 thrips per three leaves). The untreated control (T_7) recorded the highest mean population (10.72 thrips per three leaves) throughout the observation period. The present findings clearly demonstrate that Acetamiprid 20 SP provided rapid knockdown and sustained suppression of chilli thrips throughout the observation period. These findings are in close agreement with Patel *et al.* (2018) [1] and Reddy *et al.* (2019) [2], who reported the superior efficacy of Acetamiprid against chilli thrips under field conditions. Among the microbial treatments, *Lecanicillium lecanii* proved to be the most effective entomopathogenic fungus, which corroborates the findings of Hall (1981) [3] and Goettel *et al.* (2005) [4], who reported its high pathogenicity against sucking insect pests including thrips, aphids and whiteflies. The moderate efficacy of NSKE 5% is in conformity with the reports of Schmutterer (1990) [5] and Isman (2006) [6], who stated that neem-based products suppress insect populations through antifeedant, repellent and growth-regulating activities and serve as valuable components of integrated pest management programmes.

Second spray application

Based on the overall mean thrips population, Fipronil 5% SC (T_6) emerged as the most effective treatment with a mean population of 3.35 thrips per three leaves. Among the eco-friendly treatments, *Metarhizium anisopliae* (T_1) proved to be the most promising (4.95 thrips per three leaves), followed by NSKE 5% (T_2) (5.18 thrips per three leaves) and *Lecanicillium lecanii* (T_3) (5.31 thrips per three leaves). Castor oil (T_4) (5.53 thrips) and *Pongamia* oil (T_5) (5.70 thrips per three leaves) were comparatively less effective, whereas the untreated control (T_7) recorded the highest mean population (11.27 thrips per three leaves). The present findings are in close agreement with the reports of Patel *et al.* (2018) [1], who observed that Fipronil 5% SC provided rapid knockdown and prolonged suppression of chilli thrips under field conditions.

Third spray application

Based on the overall mean thrips population, Spinosad 45 SC (T_6) emerged as the most effective treatment with a mean population of 2.73 thrips per three leaves. Among the eco-friendly treatments, *Metarhizium anisopliae* (T_2) recorded the lowest mean population (4.63 thrips per three leaves), followed by *Beauveria bassiana* (T_3) (4.82 thrips per three leaves) and NSKE 5% (T_1) (4.91 thrips per three leaves). Neem oil (T_5) provided better suppression than *Pongamia* oil (T_4), recording mean populations of 5.24 and 5.44 thrips per three leaves, respectively, whereas the untreated control registered the highest mean population (11.63 thrips per three leaves). The present findings are in close agreement with the reports of Seal *et al.* (2006) [7] and Srinivasan (2012) [8], who observed the superior efficacy of Spinosad against *Scirtothrips dorsalis* under field conditions. Among the eco-friendly treatments, *Metarhizium anisopliae* proved to be the most promising microbial agent, corroborating the findings of Faria and Wraight (2007) [9] on the effectiveness of entomopathogenic fungi against sucking insect pests. The satisfactory performance of NSKE 5% and Neem oil is also in agreement with Schmutterer (1990) [5], who reported the insecticidal and antifeedant properties of neem-based botanicals.

Conclusion

The investigation demonstrated that the evaluated treatments suppressed chilli thrips to different degrees during Kharif 2025. Acetamiprid 20 SP, Fipronil 5% SC and Spinosad 45 SC recorded the lowest mean thrips populations after the first, second and third sprays, respectively. Among the eco-friendly treatments, *L. lecanii*, *M. anisopliae* and *M. anisopliae* showed comparatively lower mean thrips populations in the first, second and third spray schedules, respectively. The microbial and botanical treatments reduced thrips infestation relative to the untreated control and therefore provide useful components for biorational and integrated pest management programmes.

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