



International Journal of Research in Agronomy

E-ISSN: 2618-0618
P-ISSN: 2618-060X
© Agronomy
NAAS Rating (2025): 5.20
www.agronomyjournals.com
2025; 8(10): 468-471
Received: 09-07-2025
Accepted: 16-08-2025

Jharna Chaturvedani

Assistant Professor (Contractual),
Department of Agricultural
Entomology, Indira Gandhi Krishi
Vishwavidyalaya, Raipur,
Chhattisgarh, India

Omprakash Parganiha

Professor, Department of
Agricultural Extension, Indira
Gandhi Krishi Vishwavidyalaya,
Raipur, Chhattisgarh, India

Nitin Kumar Toorray

Professor, Department of Plant
Pathology, Indira Gandhi Krishi
Vishwavidyalaya, Raipur
Chhattisgarh, India

Deepika Devdas

Assistant Professor, Department of
Soil Science and Agriculture
Chemistry, Indira Gandhi Krishi
Vishwavidyalaya, Raipur
Chhattisgarh, India

Corresponding Author:

Jharna Chaturvedani

Assistant Professor (Contractual),
Department of Agricultural
Entomology, Indira Gandhi Krishi
Vishwavidyalaya, Raipur,
Chhattisgarh, India

Performance of spinetoram SC against thrips and leaf miners infesting watermelon crop

Jharna Chaturvedani, Omprakash Parganiha, Nitin Kumar Toorray and Deepika Devdas

DOI: <https://www.doi.org/10.33545/2618060X.2025.v8.i10g.4012>

Abstract

Bioefficacy of Spinetoram 11.7% SC @45 g a.i./ha, 54 g a.i./ha, 63 g a.i./ha along with the market standards Cyantraniliprole 10.26% OD @90 g a.i./ha and Fipronil 05% SC @50 g a.i./ha were evaluated against *Thrips palmi* and *Liriomyza trifolii* on watermelon during Rabi 2023-24 at SVB CARS, Marra, Durg. Pre-and post-treatment pest populations were recorded to assess effectiveness. For *Liriomyza trifolii*, among all the treatments, (T₃) Spinetoram 11.7% SC @63 g a.i./ha was found most effective insecticide, which recorded highest percentage of 42.93% reduction in leaf infestation with overall minimum leaf damage of 19.16% after two sprays. The next best treatment was Spinetoram 11.7% SC @54 g a.i./ha (T₂) which recorded 19.77% mean leaf infestation with 41.10% reductions in leaf damage and maximum leaf damage 19.45% was recorded in Fipronil 05% SC @50 g a.i./ha (T₅) with 17.96% reduction. In case of *T. palmi*, the overall lowest mean population of 2.30 thrips/leaf was noticed in the T₃ which was Spinetoram 11.7% SC @63 g a.i./ha followed by Spinetoram 11.7% SC @54 g a.i./ha (T₂) with 2.37 thrips/leaf and maximum population of 6.45 thrips/leaf was found in T₅ i.e. Fipronil5%SC @50 g a.i./ha after two sprays. Similarly, the highest per cent reduction of 91.14% thrips population was recorded in T₃ which was Spinetoram 11.7% SC @63 g a.i./ha followed by Spinetoram 11.7% SC @54 g a.i./ha (T₂) with 90.87% and lowest reduction of 75.15% thrips found in Fipronil5%SC @50 g a.i./ha (T₅). The maximum yield of 20.15 t/ha was obtained in Spinetoram 11.7% SC @63 g a.i./ha which was found significantly superior over all other insecticidal treatments. This establishes the supremacy of Spinetoram 11.7% SC in the effective management of both the pests on watermelon.

Keywords: Bioefficacy, leaf miner, spinetoram, thrips, watermelon

Introduction

Watermelon (*Citrullus lanatus*) (Thunb.) is a vining annual plant belongs to the family Cucurbitaceae, and grown for fleshy fruits in the tropics. The fruit is dominant during summer season especially due to its high-water content and delicious taste. It is newly introduced cash crop having good source of vitamins A and C, antioxidants, and essential minerals, contributing to its nutritional and economic value (Otutu *et al.*, 2015)^[8]. It has the highest iron concentration of any cucurbitaceous crop. Because watermelon rinds include fiber, minerals, phenolic compounds, and essential amino acids like citrulline, they also provide a lot of health benefits. The occurrence of high arginine content in the seeds of watermelon adds its medicinal benefits (Kaul, 2011)^[6]. In India, watermelon is grown on an area of 127 lakh hectares with an annual production of 3632 lakh tones in the year 2023-24. It is grown particularly as a major river-bed crop in states like Uttar Pradesh, Karnataka, West Bengal, Madhya Pradesh, and Rajasthan (Chadha, 2013)^[3]. In Chhattisgarh, it covered an area of 3.22 lakh hectares and produced 37.75 lakh tones in 2023-24 (Anonymous, 2023)^[2]. Despite its increasing popularity, a number of insect pests provide serious problems for watermelon crops, attacking the plants at all stages, from seedlings to fruit maturation. These pests affect farmers' livelihoods by lowering produce quality and causing significant yield losses. The major insect pests that pose a threat to successful watermelon cultivation include leaf miners (*Liriomyza trifolii*), thrips (*Thrips palmi*), cucurbit fruit fly (*Bactrocera cucurbitae*), red pumpkin beetle (*Raphidopalpa foveicollis*), aphid (*Aphis gossypii*), red spider mite (*Tetranychus urticae*) and whitefly (*Bemisia tabaci*).

Among these pests, *Liriomyza trifolii*, is an important polyphagous insect especially in the early phases of growth. By feeding on the mesophyll tissues while preserving the epidermis, this pest forms serpentine mines on the upper surfaces of leaves (Chandler and Thomas, 1983) [4]. According to research, infestations of leaf miners can harm watermelon crops by up to 37% (Patnaik, 2000) [9], significantly lowering yields. Another common and damaging insect in watermelon farming is the melon thrip (*Thrips palmi*). These insects harm plants directly by eating on their tissues and indirectly by serving as carriers of plant viruses including groundnut bud necrosis and watermelon silvery mottle virus. Thrips can result in yield losses of 60% to 100%, depending on the hybrid or watermelon variety and when it is sown (Krupashankar, 1998) [7]. The total productivity and financial sustainability of watermelon cultivation may be significantly impacted by this degree of damage. Hence the present study was conducted to evaluate the bioefficacy of Spinetoram 11.7% SC against thrips and leaf miner in watermelon.

Materials and Methods

The present experiment was conducted at Sant Vinobhabhave College of Agriculture and Research Station, Marra, Patan (Durg) during the period of Rabi 2023-24 to evaluate the bioefficacy of Spinetoram 11.7% w/w SC (12%w/v) against thrips and leaf miner in watermelon. The experiments was laid out in completely randomized block design (RBD) with six treatments including control and replicated four times. The Nadiyarani crop variety was grown in a plot measuring 50 m² (10 m by 5 m) with a spacing of 120*60 cm (P*R). The watermelon crop was raised according to the recommended agronomical practices. Two rounds of spraying were done during the crop season by using 500 litres of spray solution per hectare with high volume knapsack sprayer fitted with hollow cone nozzle.

Methods of Observation

Leaf miner, *Liriomyza trifolii* (Burgess): The abundance of watermelon leaf miner on plants was monitored by selecting 15 twigs per plant with fresh leaves. From selected twigs the damaged leaves with leaf miner galleries and number of total leaves on those branches were counted. Pre-treatment count of leaf miner was recorded a day before the insecticides applications. Using the data, the percent leaf miner incidence at 7 DAA, 14 DAA after each application was calculated.

Thrips, *Thrips palmi* (Karny): The thrips observations started from flower bud initiation. Pre-treatment count (0 DAA) on number of thrips (nymphs and adults) were taken one day before imposing treatments. Numbers of thrips per twig were counted. A twig of 15 cm with tender leaves on white piece of A4 size card paper were tapped 5 times arbitrarily and the same process was repeated for 20 twigs per plot to take the average count of thrips at 7, 10, and 14 days after first application and second application. The collected thrips were returned to the plant as much as possible.

The data obtained were subjected to ANOVA for a randomized block design (RBD) with appropriate statistical transformation and further, the percent reduction of pest population in respective treatments over control was computed by using the formula (Abbott's 1925) [11].

Percent reduction = $C - T / C \times 100$

Where,

T = Insect population reduction in treated plot.

C = Insect population reduction in control plot

The watermelon yield from each plot was pooled and expressed as tonnes ha⁻¹.

Results and Discussion

a) Bioefficacy of insecticides against leaf miner

The observations on pre treatment infestation by leaf miners among all the treatments were found to be non-significant (Table 2). The data on the mean percent leaf infestation (7 & 10 days) after first spray showed that *Liriomyza trifolii* infestation level varied among the various insecticidal treatments compared to untreated control (44.55%). Spinetoram 11.7% SC @63 g a.i./ha (T₃) recorded the lowest per cent infestation (25.03%) which was at par with Spinetoram 11.7% SC @54 g a.i./ha (T₂) with 26.04%. Spinetoram 11.7% SC @45 g a.i./ha (T₁) with 31.03% and Cyantraniliprole 10.26% OD @90 g a.i./ha (T₄) (30.69%) were next in terms of effectiveness while T₅ i.e. Fipronil 05% SC @50 g a.i./ha (35.64%) being the least effective treatment. The data on the mean percent leaf infestation (7 & 10 days) after second spray revealed that all the insecticidal treatments significantly reduced the percentage of leaf infestation when compared to the control (22.59%). Among the different treatments, the lowest percent infestation of 13.30% was recorded in T₃ which is Spinetoram 11.7% SC @63 g a.i./ha followed by Spinetoram 11.7% SC @54 g a.i./ha (13.51%) and Spinetoram 11.7% SC @45 g a.i./ha (15.34%). Fipronil 05% SC @50 g a.i./ha (19.45%) was least effective than Cyantraniliprole 10.26% OD @90 g a.i./ha (16.00%). The overall mean percentage of leaf infestation was recorded minimum in T₃ i.e. Spinetoram 11.7% SC @63 g a.i./ha with 19.16% which was most effective among all the treatments and was at par with Spinetoram 11.7% SC @54 g a.i./ha (T₂) with 19.77%. Spinetoram 11.7% SC @45 g a.i./ha (23.18%) and the market standard Cyantraniliprole 10.26% OD @90 g a.i./ha (23.34%) were moderately effective. The least effective treatment with maximum percentage of leaf infestation was recorded in T₅ which is Fipronil 05% SC @50 g a.i./ha (27.54%). Present results are in conformity with those of Kkadan *et al.*, (2020) who assessed the Spinetoram for control of lepidopteran in the field and nursery. Hamza *et al.*, (2023) [5] who reported after 7 DOA, Spinetoram (76.98%) demonstrated the highest insecticidal effectiveness, as measured by the percentage reduction in leaf miner infestation.

b) Bioefficacy of insecticides against thrips

The population of thrips ranged from 8.18 to 12.68 per leaf at a day before spray indicating uniform distribution throughout the experimental field and there was no significant difference between the treatments and the results obtained are presented in Table 3. The minimum population of nymph and adults per leaf at 7 and 10 days after the first spray of insecticide was recorded in the plot T₃, treated with Spinetoram 11.7% SC @63 g a.i./ha (3.97 & 3.46 thrips/leaf) and Spinetoram 11.7% SC @54 g a.i./ha (T₂) (4.02 & 3.56 thrips/leaf) which was statically superior over the other treatments such as Spinetoram 11.7% SC @45 g a.i./ha (T₁) (4.20 & 3.90 thrips/leaf) and the market standards like Cyantraniliprole 10.26% OD @90 g a.i./ha (T₄) (5.66 and 6.66 thrips/leaf) and Fipronil 5%SC @50 g a.i./ha (T₅) (5.81 and 7.04 thrips/leaf). The second spray, applied 14 days after the first spray, showed consistent efficacy trends. The post treatment results at 7 and 10 days after second application

revealed that Spinetoram 11.7% SC @63 g a.i./ha was again the most effective in reducing the population to (0.00 and 0.54 thrips/leaf) followed by Spinetoram 11.7% SC @54 g a.i./ha (T₂) (0.00 & 0.66 thrips/leaf). The untreated control maintained the highest population at 16.46 & 17.18 thrips/leaf while, Fipronil 5%SC @50 g a.i./ha was least effective. The overall reduction in thrips population compared to the control ranged from 91.14% to 75.15%. Spinetoram 11.7% SC @63 g a.i./ha achieved a 91.14% reduction, followed by Spinetoram 11.7% SC @54 g a.i./ha at 90.87%. Spinetoram 11.7% SC @45 g a.i./ha and Cyantraniliprole 10.26% OD @90 g a.i./ha showed notable reduction of 87.71% and 76.92%, respectively. Fipronil 5%SC @50 g a.i./ha was least effective with reduction of 75.15%. The present findings are in confirmation with Seal (2011) [11] who mentioned that spinosad at 0.13 lb a.i. per acre and spinetoram at 0.13 lb a.i. per acre, provide a considerable degree (>90%) of control for the management of *T. palmi* on watermelon. According to Tan *et al.*, (2021) [12], the populations of *T. palmi* showed a resistance ratio (RR) of 1.69 against spinetoram, showing low resistance to this pesticide which matches with the current finding.

Yield: After the harvest of the crop, yield data was recorded for each plot and was converted to tonnes per hectare (Table 4). It was observed that, the highest yield of Watermelon was recorded in T₃ which is Spinetoram 11.7% SC @63 g a.i./ha (20.15 t/ha) which was at par with T₂ i.e Spinetoram 11.7% SC @54 g a.i./ha (19.93 t/ha) and significantly superior than Spinetoram 11.7% SC @45 g a.i./ha (T₁) (16.15 t/ha) and the market standards i.e Cyantraniliprole 10.26% OD @90 g a.i./ha (T₄) (15.63 t/ha) and Fipronil 05% SC @50 g a.i./ha (T₅) (12.69 t/ha). Similar results was also reported by Sarkar *et al.*, (2024) [10] who mentioned highest yield of 78.89 tonnes/ha was recorded in the T₁ which was treated by spinetoram 11.7% SC @ 0.5 ml/L.

Conclusion- In Rabi 2023-24, treatment Spinetoram 11.7% SC @63 g a.i./ha (T₃) recorded significantly superior control over thrips and leaf miners which was at par with Spinetoram 11.7% SC @54 g a.i./ha (T₂). Treatment Spinetoram 11.7% SC @63 g a.i./ha (T₃) also recorded highest yield. Hence, it can be concluded that this insecticide is highly effective in controlling both the pest and can be recommended to the watermelon growing farmers.

Table 1: Treatment details for bio-efficacy

Treatments	Chemical	Dose (g ai per ha)	Dose (Formulation per ha)
T ₁	Spinetoram 11.7% w/w SC	45.00	375 ml
T ₂	Spinetoram 11.7% w/w SC	54.00	450 ml
T ₃	Spinetoram 11.7% w/w SC	63.00	525 ml
T ₄	Cyantraniliprole 10.26% OD	90.00	900 ml
T ₅	Fipronil (University standard)	50.00	1000 ml
T ₆	UTC (Untreated Control)		

Table 2: Bio-efficacy of Spinetoram 11.7% w/w SC against Leaf miner on Watermelon during Rabi 2023-24

Tr. No.	Treatments	Dose g.a.i./ha	PTI (%)	Post-treatment leaf damage (%)						Mean	Overall mean	% Reduction over contro
				First application		Mean	Second application					
				7DAA	14DAA		7DAA	14DAA				
T ₁	Spinetoram 11.7% w/w SC	45.00	40.23 (39.35)	31.39 (34.06)	30.67 (33.61)	31.03	18.74 (25.64)	11.94 (20.21)	15.34	23.18	30.95	
T ₂	Spinetoram 11.7% w/w SC	54.00	41.72 (40.22)	28.68 (32.36)	23.41 (28.92)	26.04	16.85 (24.23)	10.16 (18.51)	13.51	19.77	41.10	
T ₃	Spinetoram 11.7% w/w SC	63.00	39.85 (39.13)	27.91 (31.88)	22.15 (28.06)	25.03	16.08 (23.63)	10.52 (18.92)	13.30	19.16	42.92	
T ₄	Cyantraniliprole 10.26% OD	90.00	42.81 (40.85)	31.08 (33.87)	30.30 (33.38)	30.69	19.00 (25.83)	13.10 (20.34)	16.00	23.34	31.12	
T ₅	Fipronil	50.00	40.62 (39.58)	36.39 (37.09)	34.89 (36.19)	35.64	22.69 (28.43)	16.21 (23.73)	19.45	27.54	17.96	
T ₆	UTC		41.74 (40.23)	47.84 (43.74)	41.26 (39.95)	44.55	26.75 (31.13)	18.43 (25.42)	22.59	33.57	-	
Sem±			-	0.39	0.30		0.25	0.23				
CD at 5%			NS	1.19	0.90		0.76	0.68				

DAA= Days after application, () Figures in parentheses are angular transformed, NS= Non-significant, PTI- Pre Treatment Infestation

Table 3: Bio-efficacy of Spinetoram 11.7% w/w SC against thrips population on Watermelon during Rabi 2023-24

S.N.	Treatments	Dosage (g a.i/ha)	Pre- treatment	Thrips population (No. of Thrips leaf ⁻¹)						Overall mean	% ROC
				1 st Application			2 nd Application				
				7DAA	10DAA	14DAA	7DAA	10DAA	14DAA		
T ₁	Spinetoram 11.7% w/w SC	45.00	9.30 (3.13)	4.20 (2.17)	3.90 (2.10)	4.36 (2.20)	2.55 (1.75)	1.33 (1.35)	2.75 (1.80)	3.18	87.71
T ₂	Spinetoram 11.7% w/w SC	54.00	8.18 (2.95)	4.02 (2.13)	3.56 (2.02)	3.76 (2.06)	0.00 (0.71)	0.66 (1.08)	2.22 (1.65)	2.37	90.87
T ₃	Spinetoram 11.7% w/w SC	63.00	8.0 (2.97)	3.97 (2.11)	3.46 (1.99)	3.60 (2.02)	0.00 (0.71)	0.54 (1.02)	2.20 (1.64)	2.30	91.14
T ₄	Cyantraniliprole 10.26% OD	90.00	12.68 (3.63)	5.66 (2.48)	6.66 (2.68)	7.29 (2.79)	2.65 (1.77)	6.59 (2.66)	7.06 (2.75)	5.99	76.92
T ₅	Fipronil	50.00	12.48 (3.60)	5.81 (2.51)	7.04 (2.75)	7.50 (2.83)	4.15 (2.16)	6.88 (2.72)	7.31 (2.80)	6.45	75.15
T ₆	UTC		12.00 (3.54)	29.15 (5.45)	37.48 (6.16)	37.86 (6.19)	16.46 (4.12)	17.18 (4.20)	17.64 (4.26)	25.96	
S.Em±			-	0.039	0.038	0.029	0.016	0.027	0.029		
CD(p=0.05)			NS	0.116	0.116	0.087	0.050	0.080	0.086		

Values in the parentheses are square root transformed, DAA: Days After Application, NS= Non-significant

Table 4: The yield obtained from different treatments during *Rabi 2023-24*

Treat. No	Treatments	Dosage/ha Formulation (g a.i. ha ⁻¹)	Yield (tones ha ⁻¹)
T ₁	Spinetoram 11.7% w/w SC	45.00	16.15
T ₂	Spinetoram 11.7% w/w SC	54.00	19.93
T ₃	Spinetoram 11.7% w/w SC	63.00	20.15
T ₄	Cyantraniliprole 10.26% OD	90.00	15.63
T ₅	Fipronil	50.00	12.69
T ₆	UTC	-	9.73
	SEm±		0.033
	CD(p=0.05)		0.101

References

- Abbott WS. A method of computing the effectiveness of an insecticide. *J Econ Entomol.* 1925;18:265–267.
- Anonymous. Ministry of Agriculture and Farmers Welfare, Government of India. 2023.
- Chadha KL. Handbook of Horticulture. New Delhi: Directorate of Information and Publication of Agriculture, ICAR; 2013. p. 474–478.
- Chandler LD, Thomas CE. Seasonal population trends and foliar damage by agromyzid leaf miners on cantaloupe in lower Rio Grande Valley, Texas. *J Georgia Entomol Soc.* 1983;18:112–120.
- Hamza MA, Ishtiaq M, Mehmood MA, Majid MA, Gohar M, Radicetti E, *et al.* Management of vegetable leaf miner, *Liriomyza* spp. (Diptera: Agromyzidae) in vegetable crops. *Horticulturae.* 2023;9(2):255.
- Kaul P. Nutritional potential, bioaccessibility of minerals and functionality of watermelon (*Citrullus vulgaris*) seeds. *LWT-Food Sci Technol.* 2011;44:1821–1826.
- Krupashankar MR. Studies on bud necrosis virus disease of watermelon (*Citrullus lanatus* Thunb.). Bangalore: University of Agricultural Sciences; 1998. p. 76.
- Otutu OL, Seidu KT, Muibi BO, Oladokun F, Oyalowo MR. Potential food value of watermelon (*Citrullus lanatus*) seed constituents. *Int J Sci Technol.* 2015;3(7):222.
- Patnaik HP. Host preference of serpentine leaf miner, *Liriomyza trifolii* under field conditions. *Insect Environ.* 2000;6(1):31.
- Sarkar S, Sultana S, Saha S, Hembram S, Ganguly B. Management of thrips (*Thrips palmi*) infesting watermelon var. Kanak in Cooch Behar district of West Bengal, India. *Indian Farmer.* 2024;11(7):244–246.
- Seal DR. Abundance and management of melon thrips, *Thrips palmi* Karny (Thysanoptera: Thripidae). *Proc Fla State Hort Soc.* 2011;124:140–143.
- Tan JL, Ooi PAC, Khoo G. A preliminary study on the efficacy of spinetoram against melon thrips (*Thrips palmi*) in Malaysia. AFOB Malaysia Chapter International Symposium. 2021.