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Efficacy of selected insecticides against chilli thrips {*Scirtothrips dorsalis* (Hood)} on chilli (*Capsicum annuum* L.) in Allahabad

Satish Tirkey and Ashwani Kumar

Abstract
A field trail was conducted at the Central field, Department of entomology SHUATS, Allahabad during *kharif* July to November 2016 investigation entitled "Efficacy of selected insecticides against chilli thrips {*Scirtothrips dorsalis* (Hood)} on chilli (*Capsicum annuum* L.) in Allahabad" seven treatments were evaluated against *Scirtothrips dorsalis i.e.,* T_1 Imidacloprid 17.8 SL @ 0.2ml/lit, T_2 Cypermethrin 25 EC @ 1.8ml/lit, T_3 Spinosad 45 SC @ 0.3ml/lit, T_4 Thiomethoxam 25 WP @ 0.2ml/l, T_5 Fipronil 5 SC @ 2ml/lit, T_6 Abamactin 1.8 EC @ 1ml/lit, T_7 Profenophos 50 EC @ 2ml/lit were evaluated against chilli thrips *Scirtothrips dorsalis.* Result revealed that among the different treatments T_4 Thiomethoxam (84.14%) proved to be the most effective treatments followed by T_3 Spinosad (80.77%), T_5 Fipronil (76.71%), T_6 Abamactin (70.97), and T_1 Imidacloprid (65.12), whereas T_7 Profenophos (60.47%), T_2 Cypermethrin 43.97 was found to be least effective against this pest. The plots treated with T_4 Thiomethoxam 25 WP show highest (198.64 q/ha), followed by T_3 Spinosad 45 SC (194.23 q/ha), T_5 Fipronil 5 SC (190.56 q/ha), T_6 Abamactin 1.8 EC (184.32 q/ha), T_1 Imidacloprid 17.8 SL (170.98 q/ha), T_7 Profenophos 50 EC (156.85 q/ha) and T_2 Cypermethrin 25 EC (145.54) as compared to control T_o (90.34 q/ha). The highest yield was noticed in Thiomethoxam 25 WP (198.64 q/ha) followed by Spinosad 45 SC (194.23 q/ha).

Keywords: Chilli (*Capsicum annuum*), Cost- Benefit ratio**,** Efficacy, insecticides, Chilli thrips (*Scirtothrips dorsalis*).

Introduction
Chilli (*Capsicum annuum* L.) belongs to the family Solanaceae is one of the most important profitable spices crops grown all over India. Chilli is one of the important vegetable and commercial spice crops. Green fruits are good source of vitamin A and C. It is used as a principal ingredient of various curries, chutneys, vegetables, spices, condiments, sauces and pickles. Pungency in chillies is due to the active constituent "Capsaicin". Capsaicin, an alkaloid, is extracted from chillies and is used in medicine (Das, 2001) [3].

India is the largest producer of chillies in the world. India has emerged today as the foremost producer and exporter of chillies contributing to almost one fourth of the world production. Chilli is a widely cultivated commercial crop in India in an area of 7.74 lakh ha with 14.92 lakh MT production (NHB, 2015) [10].

The area occupied in India is 14.5m ha and the production is 8.2 lakh or 0.8 million tonnes and Uttar Pradesh occupy about 1.8 thousand ha area and 1.7 thousand tonnes production respectively. The area occupied in Allahabad region is 2455 ha and the production is 2993 tonnes (Rai and Pandey 2007) [12].

Chilli thrips, *Scirtothrips dorsalis* (Hood) Thysanoptera: Thripidae is a serious pest of chilli (*Capsicum annuum* L.) in India, responsible for leaf curling (Ananthakrishnan, 1971) [2]. The major insects that attacked chilli are mites *Polyphagotarsonemus latus* (Banks), thrips *Scirtothrips dorsalis* (Hood), aphids (*Myzus persicae* (Sulzer) and *Aphis gossypii* (Glover) and Fruit borer *Helicoverpa armigera* etc. Among the above insects, due to chilli thrips and mites only the estimated loss tuned up to 50 per cent (Ahmed, 1987 and Kandasamy, 1990) [1] [7]. Chilli thrips is considered as one of the most destructive pest of this crop. Use of chemicals is one of the most common and popular method of its control.

Chemical insecticides play an important role in combaiting the different pest problem. Unfortunately, to tackle the increasing menace of the pests, farmers have inoculated the habit of resorting to excessive and often indiscriminate use of different conventional insecticides which pushes up to the cost of production and at the same time inviting the problem of resistance to those chemicals. Therefore, the present investigation was carried out to generate information on the efficacy of some selected insecticides of agro chemical along with their

cost effectiveness against the chilli thrips in the field.

Materials and Methods

The experiment was conducted during *kharif* season 2016 at the Central field of Sam Higginbottom University of Agriculture, Technology and Sciences Allahabad, Uttar Pradesh, India, The experiment was laid out in a randomized block design with seven treatments (including control) and three replications. The variety Suryamukhi was planted on spacing of 45X30 cm in plot size of 8.8 m². Fertilizer doses and other package of practices were followed as per recommendations. The populations of thrips were recorded from top, middle and bottom leaf of the five randomly selected plants per plot and mean number per plant was calculated. Pretreatment counts were taken one day prior to spraying and post treatment counts were taken at three and ten days after each spraying. The per cent population reduction of different treatments was calculated by using Henderson and Tilton (1955) [5]. formula describe as under:

Per cent reduction= {1-Ta X Cb/ Tb X Ca} X 100

Where,

Ta = number of insects in treated plot after insecticides application

Tb = number of insects in treated plot before insecticides application

Ca = number of insect in untreated check after insecticide application

Cb = number of insect in untreated check before insecticide application

The per cent reduction was transformed to angular values from which analysis of variance was for determining critical difference (CD) at 5 per cent level of significance.

The data on thrips population thus converted to the percentage of mortality and were subjected to statistically analysis after arcsine transformation. The data on percentage reduction obtain are presented in table 1 (Overall mean 1st and 2nd spray). The incidence of chilli thrips was recorded from the five randomly selected plants. Observations were recorded one day before spray and 3rd, 10th days after spraying. Treatment wise yield of healthy marketable fruits was recorded at each picking converted them in kg/ha and data thus obtained were statistically analyzed. Economics of different were worked out based out based on yield and cost of treatments. The value of insecticides cost-benefit ratio obtained for different treatments are furnished in table 2.

Results and Discussion

The data presented in table 1on per cent population reduction of *Scirtothrips dorsalis* over control on first and second spray revealed that all the treatments were significantly super superior to control. among all the treatments Thiomethoxam 0.2ml/l recorded highest reduction of *Scirtothrips dorsalis* population *i.e*. (84.14%) which was significantly superior over control followed by Spinosad 0.3ml/l (80.77%), Fipronil 2ml/l (76.71%), Abamactin 1ml/l (70.97%), Imidacloprid 0.2ml/l (65.12%), Profenophos 2ml/l (60.47%) and Cypermethrin 1.8ml (43.97%) was least effective among all the treatments.

All the treatments were found to be significantly superior over control. Thiomethoxam was more effective in percentage reduction of thrips with (84.14%) reductions over control. similar finding made by Mandi and Senapati (2009) [8] they reported that Thiomethoxam was found most effective in reducing the population of *Scirtothrips dorsalis* as well as in increasing yield. Ghosh *et al*. (2009) [4] reported that Thiomethoxam was most effective reduce the thrips population and also increased the yield of green chilli. Jadhao *et al*. (2015) reported the results revealed that spinosad 45 SC @ 0.018% was found most effective to reduce the thrips population (67.3%) and it gave highest marketable green chilli yield (9.98 t/ha). Prasad and Ahmad (2009) reported that Spinosad was effective against reducing the population of *Scirtothrips dorsalis.* Meena and Raju (2014) [9] reported that Fipronil 5% SC was most effective treatment of percent reduction of chilli thrips. Sumitha *et al*. (2008) [14] reported that Fipronil 5 SC @ 0.01% was most effective against reducing the population of *Scirtothrips dorsalis.*

Table: 1 Efficacy of selected insecticides against chilli thrips {*Scirtothrips dorsalis* (Hood)} on chilli (*Capsicum annuum* L.) during *kharif* season of 2016 (Overall mean).

Tr. No	Treatments	% Reduction over control population of *Scirtothrips dorsalis*		
		1st Spray Mean	2nd Spray Mean	Overall Mean
T_1	Imidacloprid 17.8 SL	63.34	66.91	65.12
	(0.2ml/lit)	(52.73)	(54.88)	(53.08)
T_2	Cypermethrin 25 EC	41.85	46.10	43.97
	(1.8ml/lit)	(40.30)	(42.76)	(41.53)
T_3	Spinosad 45 SC	81.57	79.98	80.77
	(0.3ml/lit)	(64.57)	(63.42)	(63.99)
T_4	Thiomethoxam 25 WP	84.22	84.06	84.14
	(0.2ml/lit)	(66.59)	(66.46)	(66.53)
T_5	Fipronil 5 SC	76.34	77.08	76.71
	(2ml/lit)	(60.89)	(61.39)	(61.14)
T_6	Abamactin 1.8 EC	68.19	73.75	70.97
	(1ml/lit)	(55.66)	(59.17)	(57.39)
T_7	Profenophos 50 EC	57.08	63.86	60.47
	(2ml/lit)	(49.07)	(53.04)	(51.04)
T_0	Control	0.00	0.00	0.00
		(0.00)	(0.00)	(0.00)
F- test		S	S	S
S. Ed. (±)		0.51	0.05	0.11
C. D. (P = 0.05)		1.56	0.16	0.34

Figures in parenthesis are arc sin transformed values.

Table 2: Economics of Cultivation

Tr. No.	Treatment	Yield q/ha	Cost of yield Rs/q	Total cost of yield in Rs	Common cost in Rs	Treat ment cost in Rs	Total cost in Rs	Net returns in Rs	C:B ratio
T_1	Imidacloprid	170.98	1500	256470	31185	2100	33285	223185	1:7.70
T_2	Cypermethrin	145.54	1500	218310	31185	1920	33105	185205	1:6.59
T_3	Spinosad	194.23	1500	291345	31185	3800	34985	256360	1:8.32
T4	Thiomethoxam	198.64	1500	297960	31185	1560	32745	265215	1:9.09
T_5	Fipronil	190.56	1500	285840	31185	1820	33005	252835	1:8.66
T_6	Abamactin	184.32	1500	276480	31185	2200	33385	243095	1:8.28
T_7	Profenophos	156.85	1500	235275	31185	2000	33185	202090	1:7.08
T_0	Untreated/Control	90.34	1500	135510	31185	0.00	31185	104325	1:4.34

Cost of yield Rs/q-1500

The yields among the treatment were significant. The highest yield was recorded in Thiomethoxam 0.2ml/Lit. (198.64 q/ha), followed by Spinosad 0.3ml/Lit (194.23 q/ha), Fipronil 2ml/Lit. (190.56 q/ha), Abamactin 1ml/Lit. (184.32 %), Imidacloprid 0.2ml/Lit. (170.98 q/ha), Profenophos 2ml/Lit (156.85 q/ha) and Cypermethrin 1.8ml/Lit. (145.54 q/ha), as compared to control T_0 (90.34 q/ha).When cost benefit ratio was worked out, interesting result was achieved. Among the treatment studied, the best and most economical treatment was Thiomethoxam 0.2ml/Lit. (1:9.09) followed by Fipronil 2ml/Lit. (1:8.66), Spinosad 0.3ml/Lit. (1:8.32), Abamactin 1ml/Lit. (1:8.28), Imidacloprid 0.2ml/Lit. (1:7.70), Profenophos 2ml/Lit. (1:7.08) and Cypermethrin 1.8ml/Lit. (1:6.59) as compared to control T_0 (1:4.34). Higher yield (198.64 q/ha) and higher cost benefit ratio of 1:12.22 was obtained from Thiomethoxam treated plots and the lowest (90.34 q/ha) in control plot and proved to be best among treatments. Mandi and Senapati (2009) [8] reported that Thiomethoxam was found most effective in reducing the population of *Scirtothrips dorsalis* as well as in increasing yield. Ravi Kumar *et al.* (2016) [13] reported that application of Spinosad 45 SC @ 0.01 percent recorded the highest yield (30050 kg ha-1).

Conclusion

Among all the treatment Thiomethoxam 0.2ml/Lit. Proved to be the best treatment followed by Spinosad 0.3ml/Lit., Fipronil 2ml/Lit. Recommended dose of chemicals may also be used for devising integrated pest management against chilli thrips (*Scirtothrips dorsalis*).

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