Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2020; 8(2): 1221-1225

Received: 10-01-2020
Accepted: 14-02-2020

Sharanappa CH
University of Agricultural Sciences, Raichur, Karnataka, India

Pramod Katti
University of Agricultural Sciences, Raichur, Karnataka, India

Arunkumar H
University of Agricultural Sciences, Raichur, Karnataka, India

Sushila N
University of Agricultural Sciences, Raichur, Karnataka, India

Desai BK
University of Agricultural Sciences, Raichur, Karnataka, India

Pampanna Y
University of Agricultural Sciences, Raichur, Karnataka, India

Corresponding Author:
Sharanappa CH
University of Agricultural Sciences, Raichur, Karnataka, India

Evaluation of insecticides against thrips (Thripidae: Thysanoptera) and mites (Tarsonemidae: Trombidiformes) infesting capsicum

Sharanappa CH, Pramod Katti, Arunkumar H, Sushila N, Desai BK and Pampanna Y

Abstract
The experiment was carried out at Main Agriculture Research Station, Raichur, during *Rabi* 2018. The observations were recorded at one day before spraying, while the post treatment observations were recorded at 3, 5 and 7 days after each spraying. There are three spray of spinosad 45 SC (60 ml/acre), spinetoram 12 SC (200 ml/acre), cynatraniliprole 10 OD (200 ml/acre), fipronil 5 SC (200 ml/acre), spiromesifen 24 SC (200 ml/acre), diafenthiuron 25 WP (200 ml/acre) and dicofol 18.5 EC (500 ml/acre) in capsicum at 20 days interval against thrips and mites. The result revealed that, the overall mean per cent reduction of thrips population after imposing, first, second and third spray was highest in spinosad 45 SC (88.15%) followed by fipronil 5 SC (87.24%) were found to be significantly superior than rest of the treatments. For the control of mites, spiromesifen 24 SC (86.23%) dicofol 18.5 SC (85.26%), diafenthuron 25 WP (82.14%) were proved to be significantly superior compared to the rest of the chemical pesticides

Keywords: Capsicum thrips, mites, spray and evaluation

Introduction
Capsicum (*Capsicum annuum* L.) is also known as 'Shimla Mirch' and 'green pepper'. t is one of the most popular and highly remunerative annual herbaceous vegetable crops. It belongs to the family Solanaceae. Fruits are non-pungent, therefore it is commonly known as sweet pepper, but few varieties have slightly pungent fruits, also popularly called as bell pepper because of its fruit shape (Vishnu, 2016) [20].

In India, it is cultivated in an area of 45,850 ha with a production of 327,020 tons. Karnataka is the major capsicum cultivating state with an area of 4,130 ha and production of 81,670 tons followed by Himachal Pradesh and Madhya Pradesh (Anon., 2017) [2]. Most of the bell peppers are harvested in about three months on an average and open pollinated varieties yields around 12-15 t/ha whereas, F_1 hybrids yields 20-25 t/ha (Reddy, 2015) [11]. Major pests in capsicum were *Scirtothrips dorsalis* Hood, *Polyphagotarsonemus latus* (Banks) (Roopa and Kumar 2014) [13].

S. dorsalis occurs at all stages of the crop growth phase and cause damage on the tender leaves resulting in upward curling, malformation and shriveling of leaves, buds and fruits. In severe cases, the leaves shed and freshly formed buds and flowers drop down (Ayyar *et al*., 1935) [3]. Yellow mite, *P. latus* feed on the lower surface of the leaves as a result leaves roll down from margin and also cause petiole elongation. They have got some bio-ecological advantages than the other pests, due to having very small in size, high biotic potential, lack of effective natural enemies, capacity to adopt newer environment quickly and quick resistance development against toxicants (Venkateshalu *et al*., 2009) [19]. Economic yield loss may be 11-75 per cent quantitatively and 60-80 per cent qualitatively in the event of serious infestation. The losses caused by various pests to capsicum crop can be avoided by adopting proper pest control tactics. I insecticide application is one of the management options that can substantially reduce yield losses associated with insect pests infestation. There are number of i insecticides available to control these pests.

Foliar applications of systemic insecticides have been found effective than soil drenches in controlling capsicum thrips and mites. To generate information regarding evaluation of insecticide against chilli thrips and mites. Evaluation of insecticides against thrips (Thripidae: Thysanoptera) and mites (Tarsonemidae: Trombidiformes) of capsicum was carried out.

Materials and methods

Investigation on field evaluation of chemical insecticides against sucking pest of capsicum was conducted at Main Agricultural Research Station, Raichur, under open condition during *Rabi* 2018. The experiment was laid out in a Randamized Block Design (RBD) with three replication having a plot size of 3 x 2.5m. Seedlings of capsicum F_1 hybrid Indra (30 days old) were procured from nursery and transplanted in the main field at spacing of 90 cm × 30 cm. All the management practices except the plant protection measures against capsicum pests were followed as per the recommended package of practices (Anon., 2013) [1].

Different i insecticides *viz.*, spinosad 45 SC (60 ml/acre), spinetoram 12 SC (200 ml/acre), Cynatraniliprole 10 OD (200 ml/acre), fipronil 5 SC (200 ml/acre), spiromesifen 24 SC (200 ml/acre), diafenthiuron 25 WP (200 ml/acre) and dicofol 18.5 EC (500 ml/acre) was evaluated against capsicum thrips and mites.

A measured quantity of insecticidal solution or powder was mixed with a little quantity of water and stirred well, after which the remaining quantity of water was added to obtain the required concentration of spray fluid. Sprayings were given by using a hand compression knapsack high volume sprayer during morning or evening hours. The plot in each treatment was sprayed with respective i insecticides ensuring uniform coverage of i insecticide.

The sprayer and the accessories were thoroughly washed before changing the i insecticides and also rinsed with the spray fluid of the chemical to be applied next. The first spraying of i insecticides was done during the vegetative phase of the crop. The remaining two sprays was done at 20 days interval during the crop growth period. The i insecticides were applied on the basis of damage symptoms and number of population appeared in the crop. Observations on the thrips and mites incidence were recorded one day before the spraying as pre-treatment count and third, fifth and seventh days after spraying as the post- treatment counts. The population of both nymphs and adults of thrips and mites were counted during early morning hours on six leaves from top, middle and bottom three leaves on 5 randomly selected plants in each plot to get a representative sample of that plot. The other insect pests encountered during the study were managed using recommended i insecticides.

The per cent reduction over untreated control was worked using modified Abbot's formula giver below.

$$P = 100 \times 1 - \frac{(T_a \times C_b)}{(T_b \times C_a)}$$

Where

P = Per cent population reduction over control

T_a = Population in treatment after spray

C_a = Population in control after spray

T_b = Population in treatment before spray

C_b = Population in control before spray (Fleming and Ratnakaran, 1985)

Results and Discussion

First spray:

3 DAS: The lowest population was recorded in spinosad 45 SC @ 60 ml/acre (1.87 thrips/3 leaves) which was found to be significantly superior than rest of the treatments followed by diafenthiuron 25 WP @ 200 g/acre (1.20 thrips/3 leaves), spiromesifen 24 SC @ 200 ml/acre (1.26 thrips/3 leaves), fipronil 5 SC @ 200 ml/acre (1.80 thrips/3 leaves)... 5 DAS: Five days after spray, the number of thrips population lies between 0.57 to 4.73 thrips/3 leaves and the lowest population was recorded in spinosad 45 SC @ 60 ml/acre (0.57 thrips/3 leaves) followed by fipronil 5 SC @ 200 ml/acre (0.67 thrips/3 leaves) and these treatments found to be significantly superior than rest of the treatments. 7 DAS: The lowest population was recorded in fipronil 5 SC @ 200 ml/acre (0.20 thrips/3 leaves) followed by spinosad 45 SC @ 60 ml/acre (0.33 thrips/3 leaves) and these treatments found to be significantly superior than rest of the treatments (Table 1).

Per cent reduction over control

The mean per cent reduction of thrips population after the first spray was highest in spinosad 45 SC (88.25%). This was followed by fipronil 5 SC (86.45%), spinetoram 12 SC (82.45%) (Table 3).

Second spray

3 DAS: The lowest population was observed in fipronil 5 SC @ 200 ml/acre (1.15 thrips/3 leaves) followed by spinosad 45 SC @ 60 ml/acre (1.20 thrips/3 leaves) and these treatments were significantly superior than rest of the treatments. 5 DAS: The lowest population was recorded in spinosad 45 SC @ 60 ml/acre (0.37 thrips/3 leaves) followed by fipronil 5 SC @ 200 ml/acre (0.57 thrips/3 leaves), and spinetoram 12 SC @ 200 ml/acre (0.73 thrips/3 leaves) and these treatments were significantly superior than rest of the treatments. 7 DAS: The least population was recorded in fipronil 5 SC @ 200 ml/acre (0.23 thrips/3 leaves) which was significantly superior than rest of the treatments followed by spinosad 45 SC @ 60 ml/acre (0.27 thrips/3 leaves), spinetoram 12 SC @ 200 ml/acre (0.37 thrips/3 leaves) and these treatments exhibited significantly superior than rest of the treatments (Table 1).

Per cent reduction over control

The mean per cent reduction of thrips population after imposing the second spray was highest in fipronil 5 SC (87.24%). This was followed by spinosad 45 SC (86.05%), spinetoram 12 SC (83.11%) (Table 3).

Third spray

3 DAS: The minimum population was recorded in spinosad 45 SC @ 60 ml/acre (0.87 thrips/3 leaves) followed by spinetoram 12 SC @ 200 ml/acre (0.93 thrips/3 leaves), fipronil 5 SC @ 200 ml/acre (1.10 thrips/3 leaves) and these treatments were significantly superior than the remaining treatments. 5 DAS: Minimum population was recorded in spinosad 45 SC @ 60 ml/acre (0.47 thrips/3 leaves) which was found to be significantly superior over the rest of the treatments followed by fipronil 5 SC @ 200 ml/acre (0.58 thrips/3 leaves). 7 DAS: The lowest population was recorded in spinosad 45 SC @ 60 ml/acre (0.20 thrips/3 leaves) followed by spinetoram 12 SC @ 200 ml/acre (0.26 thrips/3 leaves), fipronil 5 SC @ 200 ml/acre (0.30 thrips/3 leaves)

and these treatments were significantly superior in controlling the thrips than rest of the treatments (Table 1).

Per cent reduction over control

The mean per cent reduction of thrips population after the third spray was recorded maximum in spinosad 45 SC (90.15%). This was followed by fipronil 5 SC (87.24%), spinetoram 12 SC (86.24%) and the data were furnished in table 3.

Overall mean percent reduction

The overall mean per cent reduction after the first, second and third spray was highest in spinosad 45 SC (88.15%). This was followed by fipronil 5 SC (87.24%), spinetoram 12 SC (83.93%), diafenthiuran 25 WP (81.41%), cynatraniliprole 10 OD (80.05%), spiromesifen 24 SC (76.80%), dicofol 18.5 EC (53.11%). The i insecticides in the decreasing order of their efficacy were spinosad 45 SC > fipronil 5 SC > spinetoram 12 SC > diafenthiuron 25 WP > cynatraniliprole 10 OD > spiromesifen 24 SC > dicofol 18.5 EC (Table 3).

The findings of present studies indicated that spinosad 45 SC, fipronil SC and spinetoram 12 SC proved better for the management of thrips. The results in the findings are in line with the findings of Vanisree *et al.* (2017) [18] and Meena *et al.* (2017) [9], where they reported that spinosad 45 SC proved to be very effective in controlling thrips infestation and recorded highest yield and highest benefit cost ratio. Similarly Satish and Ashwani (2017) [14] who recorded that spinosad and fipronil proved to be very effective insecticides against thrips infestation and recorded highest yield. Tripti and Ashwani (2018) [17] who observed that fipronil 5 SC and spinosad 45 SC proved to be effective chemical in reducing thrips infestation and recorded highest economic returns. Dhame *et al.* (2011) [6] who reported that spinetoram 12 SC proved to be very effective against chilli thrips infestation and recorded significantly highest chilli yield.

Table 1: Evaluation of insecticides against capsicum thrips, *S. dorsalis* during *Rabi* 2018

Sl. No.	Treatments	Dose (ml or g/acre)	No. of thrips/3 leaves											
			I spray				II spray				III spray			
			1 DBS	3 DAS	5 DAS	7 DAS	1 DBS	3 DAS	5 DAS	7 DAS	1 DBS	3 DBS	5 DBS	7 DBS
1	Spinosad 45 SC	60	4.20 (2.17)	1.87 (1.53)a	0.57 (0.98)a	0.33 (0.91)a	3.87 (2.09)	1.20 (1.25)a	0.37 (0.98)a	0.27 (0.88)ab	3.37 (2.09)	0.87 (1.17)a	0.47 (0.98)a	0.20 (0.91)a
2	Spinetoram 12 SC	200	3.60 (2.02)	1.93 (1.20)ab	0.83 (1.11)ab	0.47 (0.98)ab	3.40 (2.07)	1.53 (1.20)a	0.73 (1.11)a	0.37 (0.98)ab	3.93 (2.11)	0.93 (1.20)a	0.62 (1.06)ab	0.26 (0.87)a
3	Cynatraniliprole 10 OD	200	4.93 (2.33)	1.90 (1.55)bc	1.07 (1.21)ab	0.53 (1.01)ab	4.17 (2.23)	1.65 (1.53)b	0.97 (1.21)b	0.63 (1.01)ab	4.47 (2.23)	1.85 (1.53)b	0.68 (1.21)b	0.42 (1.01)ab
4	Fipronil 5 SC	200	3.93 (2.11)	1.80 (1.52)abc	0.67 (1.08)a	0.20 (0.95)a	3.27 (1.94)	1.15 (1.14)a	0.57 (1.08)a	0.23 (0.91)a	3.33 (1.96)	1.10 (1.35)a	0.58 (1.08)ab	0.30 (0.88)a
5	Spiromesifen 24 SC	200	3.73 (2.06)	1.26 (1.33)ab	0.96 (1.18)ab	0.86 (1.19)b	3.40 (1.97)	1.67 (1.35)a	0.90 (1.18)a	0.73 (1.11)b	3.40 (1.97)	1.46 (1.33)a	0.98 (1.18)b	0.84 (1.11)b
6	Diafenthiuron 25 WP	200	3.53 (2.01)	1.20 (1.30)ab	0.98 (1.20)ab	0.57 (0.98)ab	4.40 (2.21)	1.60 (1.30)a	0.93 (1.20)a	0.47 (0.98)ab	3.80 (2.05)	1.50 (1.30)a	0.73 (1.20)b	0.52 (0.98)ab
7	Dicofol 18.5 EC	500	3.33 (1.96)	2.53 (1.74)c	1.87 (1.40)b	1.40 (1.38)c	3.63 (1.96)	2.83 (1.74)c	1.67 (1.40)c	1.30 (1.38)c	4.53 (2.24)	2.23 (1.74)c	1.47 (1.40)c	1.45 (1.38)c
8	Untreated control	--	3.27 (1.94)	3.47 (1.99)d	4.73 (2.29)d	5.00 (2.35)d	4.20 (2.39)	6.20 (2.59)d	7.40 (2.81)d	8.26 (1.38)d	5.06 (2.36)	6.46 (2.64)d	7.00 (2.74)d	8.00 (2.92)d
	S.Em (±)	--	NS	0.08	0.08	0.07	NS	0.06	0.07	0.05	NS	0.06	0.05	0.05
	CD @ 5%	--		0.23	0.25	0.22		0.19	0.20	0.16		0.19	0.16	0.15

DBS – Day before spraying; DAS – Days after spraying; NS – Non significant
Figures n parentheses are square root transformed values

3 DAS: Three days after application of the treatments, the least population was recorded in spiromesifen 24 SC @ 200 ml/acre (0.60 mites/3 leaves) which was found to be significantly superior than rest of the treatments followed by dicofol 18.5 EC @ 500 ml/acre (0.87 mites/3 leaves), diafenthiuron 25 WP @ 200 g/acre (0.93 mites/3 leaves). 5 DAS: Similar trend was followed n 5 DAS. 7 DAS: The lowest population was recorded in diafenthiuron 25 WP @ 200 g/acre (0.13 mites/3 leaves) followed by dicofol 18.5 EC @ 500 ml/acre (0.18 mites/3 leaves), spiromesifen 24 SC @ 200 ml/acre (0.28 mites/3 leaves) and these treatments were significantly superior than rest of the treatments (Table 2).

Per cent reduction over control

The mean per cent reduction of mites population after the first spray was showed highest in spiromesifen 24 SC (87.14%). This was followed by dicofol 18.5 EC (84.28%), diafenthiuron 25 WP (83.21%).

Second spray

3 DAS: The lowest population was recorded in dicofol 18.5 EC @ 500 ml/acre (0.77 mites/3 leaves) followed by spiromesifen 24 SC @ 200 ml/acre (0.80 mites/3 leaves), diafenthiuron 25 WP @ 200 g/acre (0.83 mites/3 leaves) and there treatments were significantly superior than rest of the treatments. 5 DAS: The minimum population was recorded in spiromesifen 24 SC @ 200 ml/acre (0.80 mites/3 leaves) followed by cynatraniliprole 10 OD @ 200 ml/acre (2.00 mites/3 leaves), dicofol 18.5 EC @ 500 ml/acre (0.63 mites/3 leaves). 7 DAS: The least population was recorded in spiromesifen 24 SC @ 200 ml/acre (0.40 mites/3 leaves) followed by dicofol 18.5 EC @ 500 ml/acre (0.43 mites/3 leaves), diafenthiuron 25 WP @ 200 g/acre (0.47 mites/3 leaves) and these treatments were significantly superior than rest of the treatments.

Per cent reduction over control

The mean per cent reduction of mites population after the second spray was highest in spiromesifen 24 SC (86.14%). This was followed by dicofol 18.5 EC (85.28%), diafenthiuron 25 WP (80.06%).

Third spray: Precount population of mites one day before spray

3 DAS: At three days after imposing the treatments, the number of mites population ranged between 0.84 to 3.87 mites/3 leaves and the least population was recorded in dicofol 18.5 EC @ 500 ml/acre (0.84 mites/3 leaves) which was found to be significantly superior over the remaining treatments followed by spiromesifen 24 SC @ 200 ml/acre (0.93 mites/3 leaves). 5 DAS: Similar trend was followed n n 5 DAS. 7 DAS: Seven days after application of the the treatments, the number of mites population observed between 0.33 to 5.67 mites/3 leaves and the lowest population was recorded in dicofol 18.5 EC @ 500 ml/acre (0.33 mites/3 leaves) followed by diafenthiuron 25 WP @ 200 g/acre (0.43 mites/3 leaves) spiromesifen 24 SC @ 200 g/acre (0.47 mites/3 leaves) and there treatments were significantly superior than rest of the treatments (Table 2).

Per cent reduction over control

The mean per cent reduction of mites population after imposing the third spray was recorded maximum in dicofol 18.5 EC (86.21%). This was followed by spiromesifen 24 SC (85.42%), diafenthiuron 25 WP (83.14%) (Table 3).

Overall mean percent reduction

The overall mean per cent reduction after application of first, second and third spray was highest in spiromesifen 24 SC (86.23%). This was followed by dicofol 18.5 SC (85.26%), diafenthuron 25 WP (82.14%), fipronil 5 SC (76.12%), spinosad 45 SC (74.17%), spinetoram 12 SC (71.46%), cynatraniliprole 10 OD (69.24%). The i insecticides in the decreasing order of their efficacy were spiromesifen 24 SC > dicofol 18.5 EC > diafenthuron 25 WP > fipronil 5 SC > spinosad 45 SC > spinetoram 12 SC > cynatraniliprole 10 OD.

Results in the findings are in accordance with the findings of Thania and Thomas (2013),[16] Nagaraj *et al.* (2007) [10] and Gupta *et al.* (2017) [7] who reported that spiromesifen 24 SC found to be very effective against chilli mite and also recorded highest yield. Singh *et al*., (2017) [15] who found diafenthiuron 25 WP proved to be very effective against mite population. Similarly Debashis and Sarkar (2017) [5] who recorded that diafenthiuron 25 WP and spiromesifen 24 SC proved to be very effective against chilli mite and also recorded highest fruit yield. Honnamma (2001),[8] Reddy *et al*. (2017) and Bokan *et al*., (2018) [4] who reported that dicofol were more effective against *P. latus* on chilli under field condition.

Conclusion

Among different i insecticide evaluated against thrips and mites infesting capsicum revealed that the plot treated with Spinosad 45 SC and fipronil 5 SC were found to be very effective against thrips. Similarly for the management of mites Spiromesifen 24 SC and dicofol 18.5 SC were found to be most effective and recorded highest percent reduction over control.

Table 2: Evaluatiojn of insecticide against capsicum mites *Polyphagotarsonemus latus* infesting on capsicum

Sl. No.	Treatments	Dose (ml or g/acre)	No. of mites/3 leaves											
			I spray				II spray				III spray			
			1 DBS	3 DAS	5 DAS	7 DAS	1 DBS	3 DAS	5 DAS	7 DAS	1 DBS	3 DBS	5 DBS	7 DBS
1	Spinosad 45 SC	60	1.47 (1.40)	1.20 (1.30)b	1.00 (1.22)bc	0.42 (0.96)bc	2.13 (1.62)	1.93 (1.56)b	1.10 (1.27)a	0.83 (1.15)a	2.93 (1.85)	1.73 (1.49)abc	1.40 (1.38)b	1.20 (0.80)b
2	Spinetoram 12 SC	200	1.93 (1.56)	1.20 (1.33)b	1.07 (1.25)d	0.76 (1.120)bc	2.20 (1.64)	1.73 (1.66)b	1.60 (1.45)b	1.47 (1.43)b	3.07 (1.89)	1.80 (1.52)bc	1.53 (1.43)b	1.40 (0.88)b
3	Cynatraniliprole 10 OD	200	1.47 (1.40)	1.13 (1.37)b	0.90 (1.19)ab	0.56 (0.93)c	2.33 (1.68)	2.00 (1.58)b	0.60 (1.05)a	1.40 (1.38)b	3.13 (1.91)	2.07 (1.60)c	1.93 (1.56)b	1.73 (0.98)c
4	Fipronil 5 SC	200	1.37 (1.37)	0.97 (1.21)ab	0.80 (1.14)abc	0.38 (0.94)ab	2.37 (1.69)	1.93 (1.56)b	0.87 (1.17)a	0.73 (1.11)a	2.87 (1.83)	2.00 (1.58)c	1.87 (1.54)b	1.13 (0.98)b
5	Spiromesifen 24 SC	200	2.27 (1.52)	0.60 (1.13)a	0.53 (1.02)a	0.28 (1.17)a	1.47 (1.40)	0.80 (1.14)a	0.60 (1.05)a	0.40 (0.95)a	2.27 (1.66)	0.93 (1.20)ab	0.60 (1.05)a	0.47 (0.84)a
6	Diafenthiuron 25 WP	200	1.87 (1.54)	0.93 (1.20)ab	0.73 (1.11)ab	0.13 (0.91)a	2.00 (1.58)	0.83 (1.15)a	0.73 (1.11)a	0.47 (0.98)a	2.87 (1.83)	0.96 (1.20)ab	0.73 (1.11)a	0.43 (1.02)a
7	Dicofol 18.5 EC	500	1.64 (1.46)	0.87 (1.17)ab	0.60 (1.05)a	0.18 (1.30)a	1.73 (1.490	0.77 (1.19)a	0.63 (1.06)a	0.43 (0.97)a	2.33 (1.68)	0.84 (1.17)a	0.53 (1.02)a	0.33 (0.91)a
8	Untreated control	--	2.00 (1.58)	3.27 (1.94)c	3.40 (1.97)e	3.82 (2.08)d	2.33 (1.68)	3.60 (2.02)c	4.60 (2.26)c	4.93 (2.33)c	3.20 (1.92)	3.87 (2.09)d	4.80 (2.30)c	5.67 (1.54)d
	S.Em (±)	--	NS	0.04	0.04	0.07	NS	0.06	0.05	0.06	NS	0.09	0.07	0.04
	CD @ 5%	--		0.14	0.13	0.21		0.17	0.15	0.18		0.27	0.22	0.13

DBS – Day before spraying; DAS – Days after spraying; NS – Non significant;
Figures n parentheses are square root transformed value

Table 3: Effect of different insecticides on Percent reduction of thrips, *S. dorsalis* and mites, *P. latus*

Sl. No.	Treatments	Dose (ml or g/acre)	No. of thrips/3 leaves				No. of mites/3 leaves			
			I spray	II spray	III spray	Overall Mean per cent reduction	I spray	II spray	III spray	Overall Mean per cent reduction
			Percent reduction over control	Percent reduction over control	Percent reduction over control		Percent reduction over control	Percent reduction over control	Percent reduction over control	
1	Spinosad 45 SC	60	88.25	86.05	90.15	88.15	76.16	74.18	72.18	74.17
2	Spinetoram 12 SC	200	82.45	83.11	86.24	83.93	72.32	71.84	70.22	71.46
3	Cynatraniliprole 10 OD	200	80.11	79.92	80.12	80.05	70.41	70.26	68.24	69.64
4	Fipronil 5 SC	200	86.45	87.24	88.04	87.24	78.06	76.21	74.08	76.12

5	Spiromesifen 24 SC	200	76.04	75.53	78.82	76.80	87.14	86.14	85.42	86.23
6	Diafenthiuron 25 WP	200	80.20	81.84	82.18	81.41	83.21	80.06	83.14	82.14
7	Dicofol 18.5 EC	500	52.05	54.11	53.16	53.11	84.28	85.28	86.21	85.26
8	Untreated control	--	--	--	--	--	--	--	--	--

References

1. Anonymus, *Samagra totagarika kaipidi*, bhawani offset printers Hubli. 2013, 7
2. Anonymous, Horticultural statistics at a glance. Horticulture statistics division department of agriculture, cooperation and farmers welfare, Ministry of Agriculture and Farmers Welfare, Government of India, 2017, 200.
3. Ayyar TVR, Subbaya MS, Krishnamurthi PS. The leaf curl disease of chillies due to thrips. Madras Agriculture Journal. 1935; 23:408-411
4. Bokan SC, Mokat RB, Zanwar PR, Kadam DR. Bio-efficacy of newer insecticides against chilli mite, Polyphagotarsonemus latus. International Journal of Current Microbiology Applied Science, 2018; 6:1512-1516.
5. Debashis R, Sarkar PK. Field evaluation of new generation insecto-acaricides against thrips, yellow mite and fruit borer complex of chilli. Annual Plant Protection Science. 2017; 25(1):66-73.
6. Dharne PK, Bagde AS. Bio efficacy of novel insecticide, spinetoram 12 SC (11.7 w/w) against thrips, *Scirtothrips dorsalis* Hood and fruit borer, *Helicoverpa armigera* in chilli. *Pestology*, 2011; 35(3):23-26.
7. Gupta JK, Ashok B, Agrawal VK. Comparative efficacy of bio-rationales and newer pesticides against yellow mite, *Polyphagotarsonemus latus* (banks) on capsicum under shade net house. The Bioscan., 2017; 12(1):15-19.
8. Honnamma RK, Bio- ecology and control of yellow mite, *Polyphagotarsonemus latus* (Bank) infesting potato and chilli. *M. Sc. (Agri.) Thesis*, University Agricultural Science, Bangalore (India), 2001,
9. Meena K, Anoorag RT, Rakesh K. Field efficacy of certain bio-pesticides against chilli thrips *Scirtothrips dorsalis* (Hood) on chilli (*Capsicum annuum* L.). International Journal of Current Microbiology Applied Science, 2017; 6(6):2188-2192.
10. Nagaraj T, Sreenivas AG, Patil BV, Nagangouda A, Preliminary evaluation of some new molecules against thrips, *Scirtothrips dorsalis* Hood and *Polyphagotarsonemus latus* banks mites in chilli under irrigated ecosystem. *Pest Management n Horticulture Ecosystem. 2007; 13(2):185-188*.
11. Reddy MK. Production technology of bell pepper. *Technical Bulletin* ICAR-Indian Institute of Horticultural Research, Bengaluru. pp. 2015, 1-12.
12. Reddy VA, Srihari G, Kumar KA. Evaluation of certain new insecticides against chilli thrips (*Scirtothrips dorsalis*) and mites (*Polyphagotarsonemus latus).* The asian Journal of Horticulture, 2017; 2(2):8-9.
13. Roopa M, Kumar CTA. Seasonal incidence of pests of capsicum in Bangalore conditions of karnataka, India. Global Journali Biological Agriculture Health Science., 2014, 203-207.
14. Satish T, Ashwani K. Efficacy of selected insecticides against chilli thrips {*S. dorsalis* (Hood)} on chilli (*Capsicum annuum* L.) in Allahabad. J. Pharmacognosy and Phytochemistry. 2017; 6(5):322-324.
15. Singh AP, Sandeep KS, Singh RN. Evaluation of novel and conventional acaricides against yellow mite, *Polyphagotarsonemus latus* (banks) on chilli and their effect on prevailing natural enemies, *Amblyseius* sp. in Varanasi region. International Journal Current Microbiology Applied Science. 2017; 5:2538-2544.
16. Thania SV, Thomas BM. Bioefficacy and safety evaluation of newer insecticides and acaricides against chilli thrips and mites. Journal of Tropical Agriculture. 2013; 51(2):111-115.
17. Tripti S, Ashwani K. Field efficacy of some insecticides against chilli thrips, *Scirtothrips dorsalis* (Hood) in Allahabad (U.P.) Journal Entomology and Zoological Studies, 2018; 6(5):192-195.
18. Vanisree K, Upendhar S, Rajasekhar P, and Ramachandra RG. Effect of newer insecticides against chilli thrips, *Scirtothrips dorsalis* (Hood). J. Entomol. Zool. Stud., 2017; 5(2):277-284.
19. Venkateshalu, Srinivas AG, Nadagouda S, Hanumantharaya L. Bio-efficacy of plant product, Stanza against chilli thrips, *Scirtothrips dorsalis* Hood and chilli mite, *Polyphagotarsonemus latus* (Banks). Karnataka Journal of Agriculture Sciences., 2009; 22:559-60.
20. Vishnu S. *Vegetable science and technology in India*, 2nd Edition, Kalyani Publishers, New Delhi, 2016, 365.