



EFFECT OF BIFENTHRIN 8 SC ON THE POPULATION OF SPIDERS (ARACHNIDA: ARANEAE) IN OKRA (*ABELMOSCHUS ESCULENTUS* (L.) MOENCH) ECOSYSTEM

*Kotha Thulasiram, ¹K. Kumar, ²A. Naga Vamsi Krishna

*Department of Extension, Regional Agricultural Research Station, Lam, Guntur-522 034, Andhra Pradesh, India.

¹Department of Agricultural Entomology and Nematology, Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal-609 603. U. T. of Puducherry, India.

²Department of Agronomy, Regional Agricultural Research Station, Lam, Guntur-522 034, Andhra Pradesh, India.

*Corresponding author E- mail: ramtulasi988@gmail.com

ABSTRACT: Effect of Bifenthrin 8 SC on the population of spiders in okra ecosystem was evaluated with the help of two supervised field experiments conducted during *kharif* 2012 and *rabi* 2013 at Eastern farm of Pandit Jawaharlal Nehru College of Agriculture and Research Institute (PAJANCOA & RI). The experiment was laid out in a Randomized Block Design (RBD) with three replications and ten treatments namely bifenthrin 8 SC @ 200, 160, 140, 120, 100, 80 and 60 g a.i./ha, cypermethrin 10 EC @ 70 g a.i./ha and dicofol 18.5 EC @ 500 g a.i./ha as standard checks along with untreated check, the hybrid used was MH 10. The results showed that the overall mean population of spiders was higher in the untreated check (4.62/plant) while a low population was recorded in the treatment with bifenthrin 8 SC @ 160 g a.i./ha (0.31/plant) and it was on par with the treatments bifenthrin 8 SC @ 200, 140, 120 g a.i./ha during *kharif*, 2012. In *rabi*, 2013, a higher population was recorded in the untreated check (3.96/plant) while a low population was observed in the treatment with bifenthrin 8 SC @ 200 g a.i./ha (0.30/plant) and it was on par with the treatments bifenthrin 8 SC @ 160, 140, 120 g a.i./ha. It was also found that, all the insecticides were almost equal in effects on the population of spiders. It was also found that, the population was higher in the treatment with cypermethrin 10 EC @ 70 g a.i./ha (1.02 and 0.92/plant in *kharif* and *rabi* respectively) compared to the other treatments.

Key words: Bifenthrin 8 SC, spiders, effect and okra ecosystem

INTRODUCTION

Okra is a native of Tropical Africa commonly known as bhendi or lady's finger in India. It is grown extensively in tropical and subtropical parts of the world. Okra tender fruits are used as vegetable, eaten boiled or in culinary preparation as sliced and fried pieces. It is also used for thickening soups and gravies, because of its high mucilage content. Dry seeds of okra contain 20 to 30 per cent crude protein. It is a valuable in the diet of people of the developing countries, which is mainly cereal based and deficit in vitamins and minerals. The greenish yellow edible oil from okra has a pleasant taste and odour, and is high in unsaturated fatty acids such as oleic acid and linoleic acid [6]. The oil content of the seed is quite high (18-20%) and the oil yield is of about 794 kg/ha [8]. It was also known that unspecified parts of the plant reportedly possess diuretic properties and okra seed oil contains male contraceptive gossypol. India stands top in area and production. It is cultivated in an area of 4.98 lakh hectares with an annual production of 57.84 lakh tonnes and productivity of 11.6 tonnes/ha [10]. It was reported that, as high as 72 species of insects have been recorded on okra [14]. Ravikumar *et al.* [13] and Rajapal and Joshi [12] reported that among the predators spiders, ants and beetles play significant role in balancing the population of harmful insects in okra ecosystem. To tackle the pest menace, farmers resort to use of insecticides as the first line of defence sources against these insect pests, in spite of their drawbacks. The efforts in the past resulted in the development of less persistent chemicals with novel mode of action to overcome the ecological constraints. Bifenthrin is photo stable synthetic pyrethroid and effective against many pests [15]. However, for selections and strategic application, a comprehensive knowledge of lethal residual effects on insect pest and associated biocontrol agents is required. Hence, the present study was carried out to study the effect of Bifenthrin 8 SC on the population of spiders in okra ecosystem.

MATERIALS AND METHODS

Two field experiments were conducted at Eastern block of Horticulture farm of Pandit Jawaharlal Nehru College of Agriculture and Research Institute (PAJANCOA and RI), Karaikal, U. T. of Puducherry during *kharif* 12 and *rabi* 13 to evaluate the effect of bifenthrin 8 SC on the population of spiders. The experiment was laid out in a randomized block design (RBD) with three replications and ten treatments in a 3.5×7.5 square meter plot with a spacing of 60×30 cm and the hybrid used was MH 10.

The details of treatments are as under:

1. Bifenthrin 8 SC @ 60 (T₁), 80 (T₂), 100 (T₃), 120 (T₄), 140 (T₅), 160 (T₆) and 200 (T₇) g a.i./ha.
2. Dicofol 18.5 EC @ 500 g a.i./ha (T₈)
3. Cypermethrin 10 EC @ 70 g a.i./ga (T₉) and
4. Untreated check (T₁₀)

The population spiders were recorded in the field experiment I and II. *In situ* counts were recorded on ten randomly selected plants per plot leaving the border rows prior to treatment and also at 1, 3, 5, 7 and 14 DAT. The total number of natural enemies were counted and expressed as number per plant. The observations recorded spiders were transformed by using the formula $\sqrt{X + 0.5}$ and used for statistical analysis. The data obtained from the field were analysed in a simple randomized block design by “F” test for significance as described by Panse and Sukhatme [10]. Critical difference values were calculated at five per cent probability level and the treatment mean values of the experiment were computed using Duncan’s Multiple Range Test (DMRT) [7].

RESULTS AND DISCUSSION

Five species of spiders viz., *Salticus spp.*, *Lycosa pseudoannulata* (Boes. et Str.), *Clubiona spp.*, *Oxyopes rufisternum* (Thorell), *Phiddipus spp.* were observed during *kharif*, 2012 and *rabi* 2013.

Table 1. Effect of bifenthrin 8 SC on the population of spiders during *kharif* (July-Oct 2012) in okra (Field experiment I)

S.No	Treatments	Conc. a.i./ha in g	Number/plant #				Overall mean	Per cent reduction over control
			I Foliar application	II Foliar application	III Foliar application	IV Foliar application		
1.	Bifenthrin 8 SC	60	0.58 (1.24) ^c	0.69 (1.28) ^c	0.47 (1.21) ^c	0.71 (1.29) ^c	0.61 (1.27) ^{bc}	86.79
2.	Bifenthrin 8 SC	80	0.57 (1.24) ^c	0.63 (1.26) ^{cd}	0.41 (1.18) ^{cd}	0.58 (1.25) ^{cd}	0.55 (1.24) ^{bc}	88.09
3.	Bifenthrin 8 SC	100	0.48 (1.21) ^{cd}	0.55 (1.23) ^{cd}	0.37 (1.17) ^{cd}	0.56 (1.24) ^{cd}	0.49 (1.22) ^{bc}	89.39
4.	Bifenthrin 8 SC	120	0.43 (1.19) ^{cd}	0.41 (1.18) ^{cd}	0.30 (1.14) ^{cd}	0.43 (1.19) ^{de}	0.39 (1.18) ^c	91.55
5.	Bifenthrin 8 SC	140	0.34 (1.15) ^{cd}	0.43 (1.19) ^{cd}	0.23 (1.11) ^d	0.41 (1.18) ^{de}	0.35 (1.16) ^c	92.42
6.	Bifenthrin 8 SC	160	0.29 (1.13) ^d	0.37 (1.16) ^d	0.25 (1.11) ^d	0.31 (1.13) ^e	0.31 (1.14) ^c	93.29
7.	Bifenthrin 8 SC	200	0.30 (1.13) ^d	0.43 (1.18) ^{cd}	0.24 (1.11) ^d	0.34 (1.15) ^e	0.33 (1.15) ^c	92.85
8.	Cypermethrin 10 EC	70	0.90 (1.36) ^b	1.22 (1.46) ^b	0.93 (1.38) ^b	1.03 (1.41) ^b	1.02 (1.42) ^b	77.92
9.	Dicofol 18.5 EC	500	0.94 (1.37) ^b	1.07 (1.41) ^b	0.89 (1.36) ^b	1.18 (1.46) ^b	1.02 (1.42) ^b	77.92
10.	Untreated check	-	2.34 (1.82) ^a	3.89 (2.21) ^a	5.33 (2.51) ^a	6.91 (2.81) ^a	4.62 (2.34) ^a	-
	CD (P=0.05)	-	0.072**	0.075**	0.059**	0.061**	0.131**	-

** - Significant at P=0.01, # - Mean of 1 Foliar application, Mean of 3 replications, DAS – Days after sowing, DAT – Days after treatment, In a column mean followed by a common letter are not significantly different by DMRT (P=0.05), Values in parentheses are $\sqrt{X + 0.5}$ transformed values

Field experiment I

The effect of bifenthrin 8 SC on the population of spiders in *kharif* 2012 on okra hybrid MH 10 are presented in Table 1. The population of spiders was observed at each foliar application. The mean population of spiders ranged from 0.29 to 2.34, 0.37 to 3.89, 0.23 to 5.33 and 0.31 to 6.91/plant at I, II, III and IV foliar application respectively. It was found that a low population of spiders was observed in all insecticide treated plots which ranged from 0.23 to 1.22/plant while a higher population was observed in the untreated check which ranged from 2.34 to 6.91/plant at I, II, III and IV foliar application. The overall mean population of spiders ranged from 0.31 to 4.62/plant. Among the treatments a low population of spiders was observed in the insecticide treated plots which ranged from 0.31 to 1.02/plant and the population was high in the untreated check (4.62/plant) throughout the crop growth period. It was found that the per cent reduction of spiders was higher in all the treatments which ranged from 77.92 to 93.29 per cent compared to the untreated check.

Table 2. Effect of bifenthrin 8 SC on the population of spiders during *rabi* (Jan-April 2013) in okra (Field experiment II)

S.No	Treatments	Conc. a.i./ha in g	Number/plant #					Overall mean	Per cent reduction over control
			I Foliar application	II Foliar application	III Foliar application	IV Foliar application			
1.	Bifenthrin 8 SC	60	0.63 (1.27) ^a	0.71 (1.30) ^c	0.59 (1.25) ^c	0.79 (1.32) ^c	0.68 (1.30) ^{bc}	84.84	
2.	Bifenthrin 8 SC	80	0.63 (1.27) ^{bc}	0.69 (1.29) ^c	0.53 (1.23) ^c	0.71 (1.30) ^c	0.64 (1.28) ^{bc}	83.84	
3.	Bifenthrin 8 SC	100	0.53 (1.23) ^{bc}	0.68 (1.29) ^c	0.48 (1.21) ^{cd}	0.65 (1.28) ^c	0.59 (1.26) ^{bc}	85.10	
4.	Bifenthrin 8 SC	120	0.41 (1.18) ^{cd}	0.42 (1.18) ^d	0.37 (1.17) ^{de}	0.42 (1.19) ^d	0.41 (1.19) ^c	89.64	
5.	Bifenthrin 8 SC	140	0.35 (1.16) ^{de}	0.41 (1.18) ^d	0.32 (1.15) ^{ef}	0.39 (1.18) ^d	0.37 (1.17) ^c	90.65	
6.	Bifenthrin 8 SC	160	0.33 (1.15) ^{de}	0.34 (1.15) ^d	0.28 (1.13) ^{ef}	0.36 (1.16) ^d	0.33 (1.15) ^c	91.66	
7.	Bifenthrin 8 SC	200	0.30 (1.14) ^{de}	0.31 (1.14) ^d	0.25 (1.11) ^f	0.35 (1.16) ^d	0.30 (1.14) ^c	92.42	
8.	Cypermethrin 10 EC	70	0.85 (1.34) ^e	0.92 (1.37) ^b	0.83 (1.34) ^b	1.07 (1.43) ^b	0.92 (1.38) ^b	76.76	
9.	Dicofol 18.5 EC	500	0.85 (1.34) ^b	0.83 (1.34) ^{bc}	0.82 (1.34) ^b	1.01 (1.41) ^b	0.88 (1.37) ^b	77.77	
10.	Untreated check	-	2.37 (1.83) ^b	3.26 (2.06) ^a	4.88 (2.42) ^a	5.34 (2.52) ^a	3.96 (2.21) ^a	-	
	CD (P=0.05)	-	0.061**	0.052**	0.061**	0.037**	0.098**		

** - Significant at P=0.01, # - Mean of 1 Foliar application, Mean of 3 replications, DAS – Days after sowing, DAT – Days after treatment, In a column mean followed by a common letter are not significantly different by DMRT (P=0.05), Values in parentheses are $\sqrt{X + 0.5}$ transformed values

Field experiment II

During *rabi*, 2013 the effects of bifenthrin 8 SC on the population of spiders on okra hybrid MH 10 are presented in Table 2. The mean population of spiders ranged from 0.30 to 2.37, 0.31 to 3.26, 0.25 to 4.88 and 0.35 to 5.34/plant at I, II, III and IV foliar application respectively. It was found that a low population of spiders was observed in all insecticide treated plots which ranged from 0.25 to 1.07/plant while a higher population was observed in the untreated check which ranged from 2.37 to 5.34/plant at I, II, III and IV foliar application. The overall mean population of spiders ranged from 0.30 to 3.96/plant. Among the treatments, a low population of spiders was observed in all the insecticide treated plots which ranged from 0.30 to 0.92/plant and the population was high in the untreated check (3.96/plant) throughout the crop growth period. It was found that the per cent reduction was higher in all the treatments which ranged from 76.76 to 92.42 per cent compared to the untreated check. The present findings revealed that, all the insecticides reduced the population of spiders but did not eliminated completely from the okra ecosystem. It was found that higher doses of bifenthrin 8 SC *viz.*, 120, 140, 160 and 200 g a.i./ha resulted in higher per cent reduction of spiders. It was also found that a lower per cent reduction was observed in the lower doses of bifenthrin 8 SC *viz.*, 60, 80, 100 g a.i./ha.

Hence, it was concluded that the higher doses of bifenthrin 8 SC *viz.*, 120, 140, 160 and 200 g a.i./ha found to have an impact on the population of spiders while lower doses (60, 80 and 100 g a.i./ha) found to have a lesser impact on the population of spiders. Laboratory studies conducted by Prabhakar *et al.* [11] revealed that the pyrethroids namely bifenthrin was less toxic to hymenopteran parasitoids attacking citrus and cotton followed by fenpropathrin and cyfluthrin. Alzoubi and Cobanoglu [1, 2, 3, 4] reported that bifenthrin 10 EC (Talstar) @ 100 g a.i./ha was moderately harmful to the predatory mite, *Amblyseius californicus* in cucumber. Dhaka *et al.* [5] reported that highest number of coccinellids were recorded in biopesticide treated plots followed by bifenthrin 10 EC @ 500 ml/ha and other tested insecticides in tomato. The present findings were in close concurrence with the above findings.

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