Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

J E Z S Journal of Entomology and Zoology Studies

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2020; 8(2): 1740-1743

Received: 22-01-2020
Accepted: 24-02-2020

Randhawa Harpal Singh
Senior Entomologist PAU
Regional Research Station
Gurdaspur, Punjab, India

Kaur Paramjit
Asstt Entomologist Dept
Entomology, PAU, Ludhiana,
Punjab, India

Damanpreet
Research Assistant, PAU
Regional Research Station
Gurdaspur, Punjab, India

Corresponding Author:
Randhawa Harpal Singh
Senior Entomologist PAU
Regional Research Station
Gurdaspur, Punjab, India

Bioefficacy of oberon 22.9% (spiromesifen) against red spider mite, *Tetranychus urticae* koch in okra and effect on its natural enemies

Randhawa Harpal Singh, Kaur Paramjit and Damanpreet

Abstract
The study was carried out to assess the efficacy of Oberon 22.9% (spiromesifen) SC against okra red spider mite at surrounding area of PAU Regional Research Station Gurdaspur. The efficacy of Oberon 22.9% @ 250, 375 & 500 ml was compared along with earlier recommended insecticide Rogor 30 EC @ 675 ml per hectare. The results revealed that all the insecticidal treatment significantly decreased the mite population (1.41 to 2.04 mites/2 cm^2 leaf area) as compared to control (21.01mites/2 cm^2 leaf area) fourteen days after spray. But Oberon 22.9% @ 500 ml/ha showed high performance with least mite population (1.41) and it was par with its median and lowest doses with mite population (1.71 & 1.93) and Rogor 30 EC (2.04). The maximum fruit yield (100.42 q/ha) was recorded with highest dose of Oberon. All the acaricidal treatments under present study had no any significant impact on population of natural enemies of red spider mite.

Keywords: Doses, efficacy, hectare, oberon, population, okra red spider mite

Introduction
Okra (*Abelmoschus esculentus*) (L.) Moench is a nutritious food with many health benefits. It is rich in magnesium, calcium, folate, fibre, antioxidants, and vitamin C, K1, and A. Its medicinal value has also been reported in stabilizing blood sugar and shows anticancer properties (Singh *et al.*, 2014) [1]. It is an important vegetable grown for its green tender fruits, which are used as a vegetable in a variety of ways. It can be fried and cooked with necessary ingredients. India is the second largest producer of vegetables in the world next to China. In India, okra or bhendi is intensively cultivated in Karnataka, Maharashtra, Tamil Nadu, Punjab and Uttar Pradesh. Numbers of biotic, abiotic and physiological factors are the main constraints encountered by the farmers in getting higher productivity and good quality produce. Among biotic factors, many insect and mite pests hamper the okra productivity in almost all areas of the world. Among the pests, Tetranychidae mites are serious pests of okra and widely distributed in tropical and sub-tropical areas of the world. The red spider mite, *Tetranychus urticae* is a polyphagous, and has been recorded from over 300 plant species worldwide and it inflict heavy damage to okra plants by sucking sap from under surface of leaves resulting in white speckles which coalesce and produced large patches. As the population increases, mites web profusely covering the entire foliage on all sides resulting in poor crop growth. In some cases, total failure of the crop has been reported. In case of severe infestation, adults form clusters at the tip of heavily infested plants, form ballooning threads and wait for wind to blow off the plant for dispersal (Zhang 2003) [2].

Among the various strategies adopted to combat the pests, insecticides are the first line of defence. Most of the insecticides used on agricultural crops are based on quite limited number of chemically different classes out of them the most important inorganic insecticides that are used against pests belongs to synthetic groups and the indiscriminate use of these chemicals leads to adverse effects like residues in fruits, environmental contamination, resurgence and destruction of natural enemies which suggest the need to develop alternative management strategies. (Van Leeuwen *et al*., 2010) [3]. Therefore, an efforts have been made in present investigation to evaluate the efficacy of Oberon 22.9% (spiromesifen) against red spider mite in okra crop.

Materials and Methods

The experiment on bioefficacy of Oberon 22.9% (spiromesifen) against red spider mite, *Tetranychus urticae* in okra was carried at surrounding area of PAU, Regional Research Station, Gurdaspur in the year 2018-19. The crop variety Punjab 7 was sown in the month of June with spacing 45 X 15 cm. The crop was raised by following all agronomic recommendations of PAU for vegetable crops except plant protection measures. The experiment was laid out in a randomized block design with three replication and five treatments. The plot size was kept 20 m^2 of each treatment and paths were maintained at 1.0 and 0.5 meter between replication and treatment plots as buffer, respectively. All the pesticidal treatments were applied as foliar spray. For recording observations of mite, five plants were randomly selected and tagged in each net plot. The mite population was recorded on 2.0 cm^2 leaf area of three leaves selected randomly from top, middle and bottom canopy of the selected plants prior and after 3, 7, 10 and 14 days of spray with help of binocular microscope. The data were statistically analyzed using square root transformation. The fruit yield at each picking from each net plot area was recorded and finally converted into quintal per hectare.

Pesticidal treatments and Data analysis: The present study was carried out to assess the relative efficacy of green chemistry insecticide i.e. Oberon 22.9% (Spiromesifen 240 SC) @ 250, 375 & 500 ml and Rogor 30 EC (dimethoate) @ 625 ml (check) per hectare and untreated control. The 250 litres of water per hectare was used with manually operated knapsack sprayer with flat fan nozzle for application of pesticides. The data recorded during the course of investigation were subjected to statistical analysis by using analysis of variance technique (Gomez and Gomez, 1984) [4].

Results and Discussion

Bioefficacy of Oberon 22.9% (spiromesifen) against red spider mite: The data on mite population recorded prior and 3, 7, 10 and 14 days after spray with different treatments are presented in table 1. The recorded data indicated that mite population was uniformly distributed in all the experimental plots as it evident from the observations recorded before imposing of acaricidal spray.

The mite population per 2 cm^2 leaf area at 3 days after spray varied (1.11 to 1.73) between insecticidal treatments and untreated control (16.31). It was further revealed that all the doses of tested molecule Oberon 22.9% (spiromesifen) as well as standard (Rogor 30EC) insecticide remained at par with each other. The numerically least (1.11) mite population per 2 cm^2 leaf area was recorded with higher dose (500 ml/ha) of tested molecule of Oberon and it was followed with its median (1.22 mite) & least dose (1.42 mite) and Rogor (1.73 mite).

Observations recorded at 7 days after spray (Table 1) the higher dose of acaricide, Oberon 22.9% (500 ml/ha) has lowest mite (0.40) population per 2 cm^2 leaf, where its median (375 ml/ha) has mite population 0.82 and Rogor stood next in efficacy with mite population 0.99. Similarly, ten days after spray the mite population per 2 cm^2 varied 1.97 to 2.65 with different insecticidal treatment as compared to control 22.20. The higher and median doses of tested insecticide Oberon 22.9% has mean mite population 1.97 and 2.19, respectively and these doses were at par with each other and significantly better than standard insecticide (Rogor) with mean mite population 2.65. More or less same trends of effectiveness of Oberon 22.9% in controlling okra mite was also observed at 14 days after spray.

Pooled data computed for spray indicated least number of mites (1.41 to 2.04) per 2 cm^2 leaf area with insecticidal treated plots over untreated control (21.01). However, tested insecticide i.e. Oberon 22.9% (500 ml/ha) registered significantly lowest (1.41) mite population and it was remained at par with median dose (1.71 mites) and significantly better than its lowest dose (1.93 mites) and standard insecticide (2.04 mites).

Insecticidal effects on natural enemies: The population of natural enemies prevailing in okra crop was very low. However, the population of predators (spiders and ladybird beetle) was observed during the study period. The data recorded for these natural enemies are presented in table 2. There was no significant effect of any of the acaricidal treatments after 3, 7, 10 and 14 days of application as the data are non-significant. Data clearly indicated that all the acaricidal treatments under present study had no any significant impact on population of predators and also there was no phytotoxic effects on okra leaves, flowers and fruits were observed.

Average okra yield and cost benefit ratio

The data (Table 3) on marketable okra fruits yield per hectare recorded in different treatments indicated that highest (100.42 q) yield was harvested from the plots sprayed with highest dose (500ml/ha) of Oberon 22.9%. However, it was at par with its rest of doses (375 & 250 ml/ha) with 99.50 & 96.42 and 95.17 quintals with Rogor 30 EC insecticide. Whereas, the significantly lowest yield was recorded in untreated plots (88.17 q/ha). It was showed that Oberon acaricide resulted in more positive impact on the crop yield. The yield analysis of field experiment demonstrated the efficacy of new molecule in increasing okra fruit yield as compared to untreated control. The highest Cost: Benefit (Table 3) was achieved with lowest dose of Oberon i.e. Rs. 1:47.14 and it was followed by its median and highest dose Rs. 1: 43.16 and 1: 35.00, respectively. The least cost benefit ratio (1: 28.00) was obtained with synthetic insecticide.

The present study is in conformity with other studies (Raghavendra *et al.*, 2017 [5] revealed that acaricides i. e. Spiromesifen and propargite significantly reduced the *T. urticae* population after fourteen days of spray in cucumber, rose and okra. Hundred per cent reduction of mites per leaf was observed in spiromesifen and 50-75 per cent mortality in neem products at seven days after spraying under poly house (Pathak 2016) [6]. Similarly, Sekh *et al.*, (2007) [7] proved spiromesifen 240 SC (Oberon) as an excellent control of two spotted spider mite on brinjal, coupled with significant increase in fruit yield. Fanigliulo *et al.*, (2010) [8] observed that spiromesifen @ 45 and 60 g/ha was very effective against mite on *Capsicum annuum* and there was no phytotoxicity and harmful effects on predators and parasitoids of mites. As per the report of Varghese and Mathew (2013) [9], spiromesifen @ 100 g a.i./ha found effective in reducing chilli mite population. Kavya *et al.*, (2015) [10] who reported that spiromesifen reduced the overall mite population more significantly along with significant increase in yield and it was very safe towards the natural enemies in brinjal crop. It was found the safest insecticide against natural enemies viz predatory mites, coccinellid beetles and spiders.

Table 1: Effectiveness of Oberon 22.9% (spiromesifen) against red spider mite infesting okra

Treatment No.	Insecticide	Dose/ha (ml)	Number of mites per 2 cm^2 leaf area (days after spray)					
			BF	3	7	10	14	MEAN
T1	Oberon 22.9% (spiromesifen)	250	8.95 (3.15)	1.42 (1.55)	1.21 (1.49)	2.60 (1.90)	2.80 (1.95)	1.93 (1.70)
T2		375	7.65 (2.94)	1.22 (1.48)	0.82 (1.35)	2.19 (1.78)	2.39 (1.84)	1.71 (1.63)
T3		500	9.49 (3.24)	1.11 (1.45)	0.40 (1.18	1.97 (1.72)	2.03 (1.74)	1.41 (1.53)
T4	Rogor 30 EC (Dimethoate)	625	8.98 (3.16)	1.73 (1.65)	0.99 (1.41)	2.65 (1.91)	2.79 (1.95)	2.04 (1.73)
T5	Control	-	9.44 (3.23)	16.31 (4.16)	21.29 (4.72)	22.20 (4.82)	24.22 (5.02)	21.01 (4.68)
CD(p=0.05)			NS	(0.31)	(0.19)	(0.10)	(0.08)	(0.13)

BS: Before spray Figures in the parntheses are square root transformation

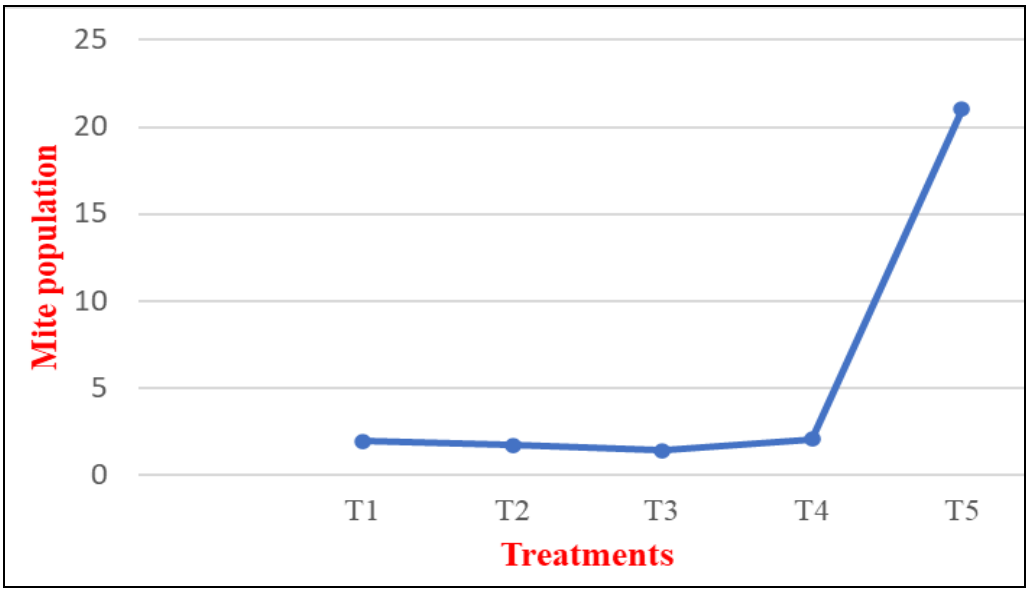

Fig 1: Population build up of *Tetranychus urticae* in relation to pesticidal treatments

Table 2: Oberon 22.9% (spiromesifen) on Natural enemies

Treatment	Mean population of spiders and Lady bird beetles per plant days after spray										
	BS		3		7		10		14		Mean (NE)
	Spiders	Beetles	Spiders	Beetles	Spiders	Beetles	Spiders	Beetles	Spiders	Beetles	
T1	0.43	0.67	0.37	0.61	0.60	0.77	0.40	0.57	0.66	1.0	0.63
T2	0.53	0.47	0.46	0.43	0.70	0.70	0.67	0.60	0.90	0.75	0.63
T3	0.60	0.30	0.53	0.37	0.65	0.65	0.73	0.53	0.89	0.63	0.59
T4	0.63	0.22	0.51	0.30	0.50	0.24	0.38	0.47	0.84	0.51	0.44
T5	0.57	0.60	0.47	0.57	0.63	0.57	0.70	0.50	0.68	1.10	0.65
CD (p=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	

BS : Before spray NE: Natural enemies

Table 3: Effect Oberon 22.9% (spiromesifen) insecticide on okra yield and cost benefit ratio

Insecticide	Dose/ha (ml)	Marketable fruit Yield (qt/ha)	Net Income (Rs)	Cost Benefit ratio (Rs.)
Oberon 22.9(spiromesifen)	250	96.42(9.87)	8250	1 : 47.14
Oberon 22.9(spiromesifen)	375	99.50(10.03)	11330	1 : 43.16
Oberon 22.9(spiromesifen)	500	100.42(10.07)	12250	1: 35.00
Rogor 3 EC (Dimthoate)	625	95.17(9.56)	7000	1: 28.00
Control	-	88.17(9.44)	-	-
CD		(1.03)	-	-

Conclusion

The control of spider mite infestation was ascertained in terms of the marketable fruit yield. From three days onward after application of Oberon 22.9 reduction in okra red spider mite population was significant and superior to untreated control. However, the highest dose of Oberon 22.9% @ 500 ml/ha showed high performance with least mite population and it was par with its median and lowest. Tested acaricide Oberon resulted in more positive impact on the crop yield, other monetary parameters and resulted in highest amount of additional income as compared to other insecticide as well as over control. There was no significant difference in number of natural enemies (spiders & beetles) recorded in different treatments including untreated check. It indicated the safety property of the test product to beneficial arthropods. The present study revealed that these acaricide (Oberon 22.9%) can be used for effective and sustainable management of the mites.

References

1. Singh SK, Singh AP, Singh RN. Comparative bio efficacy of biopesticides and new molecules of acaricides

in the management of *Tetranychus urticae* Koch (Acari: Tetranychidae) in okra. The Ecosan. 2014; 4:279-283.
2. Zhang ZQ. Mites of Greenhouses: Identification, biology and control. CABI Publishing, Wallingford UK, 2003, 244.
3. Van Leeuwen T, Witters J, Nauen R, Duso C, Tirry L. The control of eriophyoid mites: State of the art and future challenges. Experimental and Applied Acarology 2010; 51:205-224.
4. Gomez KA, Gomez AA. Statistical procedures for agricultural research (2 ed.). John Wiley and Sons, New York, 1984, 680.
5. Raghavendra KV, Chinniah C, Ramaraju K, Muthiah C, Balakrishnan K. Acaricidal action of Plant Derivatives and Natural oils against two spotted spider mite, *Tetranychus urticae* Koch in Rose (Rosa sp.) ecosystem. Bulletin of Environment, Pharmacology and Life Sciences, 2017; 6:9-15.
6. Pathak RK. Prospects and strategies for organic cultivation of Horticultural crops in Himalayas, Conference on Hill Agriculture in Perspectives, organized by GBPAUT, Pantnagar, 2016.
7. Sekh K, Nair N, Bag V, Somchoudhury AK. Bioefficacy of Spiromesifen 240 SC (Oberon) against red spider mite of brinjal and effect on its natural enemies. Pestology, 2007; 31:25-28.
8. Fanigliulo A, Massa CG, Ielpo L, Pacella R, Crescenzi A. Evaluation of the efficacy of oberon (Spiromesifen), to contain infestations of mites and whiteflies on *Capsicum annuum* L. Communications in Agricultural and Applied Biological Sciences. 2010; 75:341-344.
9. Varghese TS, Mathew TB. Bioefficacy and safety evaluation of newer insecticides and acaricides against chilli thrips and mites. Journal of Tropical Agriculture, 2013; 51:111-115.
10. Kavya MK, Srinivasa N, Vidyashree AS, Ravi GB. Bio-efficacy of newer acaricides against two spotted spider mite, *Tetranychus urticae* and phytoseiid predator, *Neoseiulus longispinosus* on brinjal under field condition. Plant Archives, 2015; 15:493-497.