International Journal of Advanced Biochemistry Research

ISSN Print: 2617-4693
ISSN Online: 2617-4707
IJABR 2024; 8(8): 599-604
www.biochemjournal.com
Received: 15-05-2024
Accepted: 21-06-2024

RB Vadher
Associate Professor & Head, Dept. of Agril. Entomology, ASPEE College of Agriculture, JAU, Khapat, Porbandar, Gujarat, India

DK Ravaliya
M.Sc. (Agril.) student, Junagadh Agricultural University, Junagadh, Gujarat, India

MK Kanani
Assistant Research Scientist, Agricultural Research Station, Junagadh Agricultural University, Amreli, Gujarat, India

HV Solanki
Assistant Professor, Department of Plant breeding and genetics, ASPEE College of Agriculture, JAU, Khapat, Porbandar, Gujarat, India

PS Gorfad
Associate Professor & Head, Dept. of Agril. Extension, ASPEE College of Agriculture, JAU, Khapat, Porbandar, Gujarat, India

Corresponding Author:
RB Vadher
Associate Professor & Head, Dept. of Agril. Entomology, ASPEE College of Agriculture, JAU, Khapat, Porbandar, Gujarat, India

Management of two-spotted spider mite, *Tetranychus urticae* Koch infesting okra

RB Vadher, DK Ravaliya, MK Kanani, HV Solanki and PS Gorfad

DOI: https://doi.org/10.33545/26174693.2024.v8.i8h.1815

Abstract
Efficacy of different acaricides against mite infesting okra revealed that among the all treatments, the most effective treatment was Fenazaquin 10 EC 0.016%, resulting in the lowest mite population, at par with Fenpyroximate 5 SC 0.003%. The next best treatment was Spirotetramat 15.3 OD 0.018%, which was at par with Diafenthiuron 50 WP 0.060%. Spiromesifen 22.9 SC 0.023% was moderately effective, which was at par with bifenazate 22.6 SC 0.006% and Etoxazole 10 SC 0.008%. Spirotetramat 11.01 + Imidacloprid 11.01 SC 0.02202% and Propergite 50 + Bifenthrin 5 SE 0.1265% were less effective. However, the highest mite population was recorded from the control plot. Out of the nine acaricidal treatments evaluated, fenazaquin 10 EC 0.016% proved to be the most effective against okra mite. It exhibited the lowest mitepopulation, maximum fruit yield, and highest yield increase over the untreated control and the highest net return. Among the various acaricidal treatments, fenpyroximate 5 SC0.003% obtained the highest CBR (Cost Benefit Ratio) of 1:65.69, followed by fenazaquin 10 EC 0.016% with CBR of 1:30.80.

Keywords: Mite, acaricide, efficacy, *Tetranychus urticae*

Introduction
Okra [*Abelmoschus esculentus* (L.) Moench] is most delicious vegetable relished world over. It belongs to the family Malvaceae. The place of origin of okra is contradictory among the scientists. Rao (1985) [7] reported that the origin of okra is Northern India. Okra is particularly cultivated in almost all countries of the world (Saifullah and Rabbani, 2009) [8]. It is commercially cultivated in different parts of world *viz*., India, Iran, Pakistan, South Africa, Yugloslavia, Brazil, Thailand, Ethopia, Malaysia, Myanmmar, Afghanistan, Bangladesh, United States, Turkey and Cyprus (Benjawan *et al*., 2007) [2]. India ranks first in area and production in the world. It is a major commercial vegetable cultivated all over India particularly in the states of Andhra Pradesh, West Bengal, Jharkhand, Orissa, Uttar Pradesh, Madhya Pradesh, Karnataka, Gujarat and Maharashtra. In Gujarat, okra is grown throughout the year providing continuous and good source of income to the farmers in fetches lucrative price due to shortage of other vegetables in the market.
In Gujarat, Surat, Gandhinagar, Junagadh, Surendranagar, Baroda, Navsari, Sabarkantha, Kheda, Anand, Banaskantha, Jamnagar and Bhavnagar have been identified as major okra-growing districts with total area under okra cultivation of 0.94 lakh ha with a production of 11.48 lakh tonnes (Anon., 2023) [1]. Like other vegetable crops, okra is also attacked by a wide range of biotic and abiotic on strains. The incidence of insect pests is a major constraint for low productivity. Okra crop harbours to a large number of insect pests including vectors (Showkat *et al*., 2010) [9]. Nearly, 72 insect species have been recorded on okra (Srinivasa and Rajendran, 2003) [11]. The major pests those attack okra crop include aphid, *Aphis gossypii* Glover; leaf hopper, *Amrasca biguttula biguttula* Ishida; whitefly, *Bemisia tabaci* (Gennadius); red spider mite, *Tetranychus* spp. and shoot and fruit borer, *Earias vittella* Fab. Which cause damage to okra plants results into yield losses.
T. urticae is also called a two-spotted spider mite. In India, it is found in all states and very common in Bihar, Mysore, Rajasthan, Uttar Pradesh, Punjab, Haryana, and Gujarat. It is a polyphagous pest that feeds on 183 species of plants including vegetables. Both nymphs and adults cause damage by sucking the cell sap from the under surface of leaves and produce white spots which later get covered by a thick web.

It results in discoloration of infested leaves, which turn bronze and dry up. Severely infected plants remain stunted with reduced flowering and fruiting. In various crops loss is reported as 10 to 15 percent in rice, 15 to 20 percent in tea, 10 to 25 percent in sugarcane as well as 13 to 31, 20 to 25 and 27 to 39 percent loss in brinjal, okra and chilies, respectively (Rachna, 2004) [6].

To avoid the yield losses caused by red spider mite and encourage cultivation as well as to increase the production and productivity of okra crop, our efforts are needed to tackle the pest by extensive and indiscriminate use of chemicals on okra gives the chance of contamination of fruits with pesticides residues. In order to avoid the adverse consequences of insecticides, it was become necessary to evaluate safe and effective insecticides to develop a safe management schedule. In view of the importance of the okra crop and seriousness of this pest, it become necessary to have comprehensive detailed studies on "management of two-spotted spider mite, *Tetranychus urticae* Koch infesting okra" under the Junagadh condition. Therefore, the present investigation was carried out with the following objective: To find the efficacy of different acaricides against mite infesting okra.

Methodology

The present investigation on "management of two-spotted spider mite, *Tetranychusurticae* Koch infesting okra" was carried out at the Instructional Farm, College of Agriculture, Junagadh Agricultural University, Junagadh during *Kharif*, 2023. The methodology to be adopted on various aspects during the course of present investigations has been presented here under.

All acaricides were applied in the form of foliar spray with help of knapsack sprayer. For deciding quantity of spray fluid required per plot, the control plots were spray with water and was determined the required spray fluid. Spray fluid was prepared by mixing measured quantity of water and acaricides. The necessary care was taken to prevent the drift of acaricides to reach the adjacent plots. The first spray was done at initiation of pest population and need based subsequent application was given at 15 days interval.

Table 1: Treatment details of acaricides

Sr. No.	Treatment detail	Concentration (%)	Dose (ml or gm/10 l)
1	Fenazaquin 10 EC	0.016	16.00
2	Etoxazole 10 SC	0.008	08.00
3	Spiromesifen 22.9 SC	0.023	10.00
4	Spirotetramat 15.3 OD	0.018	12.00
5	Diafenthiuron 50 WP	0.060	12.00
6	Propergite 50 + Bifenthrin 5 SE	0.127	23.00
7	Spirotetramat 11.01 + Imidacloprid 11.01 SC	0.002	10.00
8	Fenpyroximate 5 SC	0.002	05.00
9	Bifenazate 22.6 SC	0.006	02.50
10	Untreated control	-	-

For recording the observations, five plants were selected randomly and tagged in each net plot. The observations were recorded before one day of the first spray as well as after 1, 5, 9 and 14 days of each spray. The mite population was recorded from three (upper, middle and lower) leaves of 2 cm^2 leaf area of same selected five plants. With a view to ascertain the effect of different acaricides on the yield of okra, the fruit yield per plot was recorded for each treatment and converted to hectare basis. The percent increase in yield over control was also calculated by using the following formula;

$$\text{Percent yield increase over control} = \frac{T-C}{C} = x\ 100$$

Where,
T = Yield of respective treatment (kg/ha)
C = Yield from control treatment (kg/ha)

The cost-benefit ratio (CBR) was worked out for each treatment. For this purpose, the gross realization was worked out for all the treatments including control by deducting the cost of acaricides as well as the cost of labour required for spray, from the total income of the marketable fruit yield. Net gain over control was calculated by deducting the realization of each treatment. At the end, the benefit to cost ratio for each treatment was calculated by dividing the net gain over control by the total cost of acaricides including the cost of labour for spray.

Results and Discussion

Efficacy of different acaricides against mite infesting okra

With a view to find out the efficacy of various acaricides against mite in okra, nine acaricides were evaluated in field experiment during *kharif*, 2023. Two sprays of acaricides were applied on okra at initiation of pest and after fifteen days interval. The observations on mite were recorded 1 day before spraying and 1, 5, 9 and 14 days after each spray. The results of these experiments are presented and discussed herewith.

First spray

First day after spraying

The mean population of mite recorded at one day after first spray of different acaricidal treatments (Table 2) revealed that fenazaquin 10 EC 0.016% was found the most effective acaricide as it recorded the lowest mite population i.e. 2.15 mite/2 cm^2 however, it was statistically at par with the treatment fenpyroximate 5 SC 0.003% which registered 2.21 mite/2 cm^2 mite population. The treatment of propergite 50 + bifenthrin 5 SE 0.1265% was found least effective against mite as it showed 4.19 mite/2 cm^2 which was at par with the treatment spirotetramat 11.01 + imidacloprid 11.01 SC 0.02202% (4.11 mite/2 cm^2).

Five days after spraying

The data presented in Table 2 indicated that the difference in mean mite population in various acaricidal treatments was found statistically significant. The mean mite population recorded five days after first spray of different acaricidal treatments revealed that fenazaquin 10 EC 0.016% recorded the lowest mite population i.e. 1.09 mite/2 cm^2. However, it was statistically at par with the treatment of fenpyroximate 5 SC 0.003% which registered 1.14 mite/2 cm^2 mite population. The treatment of propergite 50 + bifenthrin 5 SE 0.1265% was found least effective against mite as it showed 4.58 mite/2 cm^2 which was at par with the treatment

spirotetramat 11.01 + midacloprid 11.01 SC 0.02202% (4.27 mite/2 cm^2).

Nine days after spraying

The treatment of fenazaquin 10 EC 0.016% recorded the lowest mite population i.e. 2.52 mite/2 cm^2(Table 2). However, it was statistically at par with the treatment of fenpyroximate 5 SC 0.003% which registered 2.76 mite/2 cm^2 mite population. The treatment of propergite 50 + bifenthrin 5 SE 0.1265% was found least effective against mite as it showed 7.45 mite/2 cm^2 which was at par with the treatment spirotetramat 11.01 + imidacloprid 11.01 SC 0.02202% (7.37 mite/2 cm^2).

Fourteen days after spraying

After fourteen days of first spray, similar trend of effectiveness of tested acaricides was recorded as it observed in first, fifth and nineth day after application (Table 2). Among the evaluated acaricides, fenazaquin 10 EC 0.016% recorded the lowest mite population i.e. 8.34 mite/2 cm^2. However, it was statistically at par with the treatments of fenpyroximate 5 SC 0.003% which registered 8.59 mite/2 cm^2 mite population.

Table 2: Efficacy of different acaricides against mite infesting okra (First spray)

Tr No.	Treatments	Con. (%)	No. of mites/2 cm^2 leaf area					Pooled over period	% Reduction over untreated control
			Before spray	Days after spraying					
				1	5	9	14		
T_1	Fenazaquin 10 EC	0.016	2.07 (4.28)	1.47 (2.15)	1.05 (1.09)	1.59 (2.52)	2.89 (8.34)	1.27 (1.62)	83.16
T_2	Etoxazole 10 SC	0.008	2.06 (4.23)	1.96 (3.83)	1.76 (3.10)	2.67 (7.14)	3.32 (11.01)	2.03 (4.11)	57.25
T_3	Spiromesifen 22.9 SC	0.023	2.13 (4.52)	1.82 (3.31)	1.68 (2.82)	2.27 (5.17)	3.17 (10.03)	1.89 (3.57)	62.83
T_4	Spirotetramat 15.3 OD	0.018	2.17 (4.70)	1.74 (3.02)	1.39 (1.92)	1.91 (3.63)	3.09 (9.54)	1.62 (2.63)	72.67
T_5	Diafenthiuron 50 WP	0.060	2.11 (4.45)	1.76 (3.10)	1.46 (2.13)	2.00 (3.98)	3.15 (9.92)	1.66 (2.77)	71.24
T_6	Propergite 50 + Bifenthrin 5 SE	0.127	2.15 (4.63)	2.05 (4.19)	2.14 (4.58)	2.73 (7.45)	3.39 (11.50)	2.32 (5.38)	44.05
T_7	Spirotetramat 11.01 + Imidacloprid 11.01 SC	0.002	2.15 (4.63)	2.03 (4.11)	2.07 (4.27)	2.71 (7.37)	3.37 (11.34)	2.26 (5.11)	46.90
T_8	Fenpyroximate 5 SC	0.002	2.08 (4.34)	1.49(2.21)	1.07 (1.14)	1.66 (2.76)	2.93 (8.59)	1.30 (1.70)	82.30
T_9	Bifenazate 22.6 SC	0.006	2.18 (4.77)	1.87 (3.51)	1.71 (2.92)	2.52 (6.33)	3.20 (10.27)	1.97 (3.89)	59.53
T_{10}	Untreated control	-	2.15 (4.62)	2.17 (4.69)	3.20 (10.27)	3.24 (10.50)	3.85 (14.85)	3.10 (9.62)	-
S.Em.±		T	0.11	0.11	0.10	0.09	0.10	0.12	-
		P	-	-	-	-	-	0.07	-
		T×P	-	-	-	-	-	0.10	-
C.D.at 5%		T	NS	0.33	0.30	0.27	0.30	0.34	-
		P	-	-	-	-	-	0.21	-
		T×P	-	-	-	-	-	0.28	-
C.V. (%)		-	9.06	10.36	9.90	8.09	7.73	8.95	-

Note: Figures in parentheses are retransformed values; those outside are square root transformed values

Pooled over periods after first sprays

The mite population after pooled over the period of the first spray is presented in Table 2 revealed that in all the treatments, mite population reduced significantly over control. The treatment of fenazaquin 10 EC 0.016% was found to be the most effective, resulting in a significantly lower mite population of 1.62 mite/2 cm^2 which was at par with fenpyroximate 5 SC 0.003% which registered a mite population of 1.70 mite/2 cm^2.

Percent reduction over untreated control during first spray

Percent reduction over untreated control of mite after the first spray was calculated and presented in Table 2, it reveals that the highest percent reduction over untreated control was found in the treatment of fenazaquin 10 EC 0.016%, which recorded 83.16 percent reduction of mite population over untreated control. Treatments of propergite 50 + bifenthrin 5 SE 0.1265% and spirotetramat 11.01 + imidacloprid 11.01 SC 0.02202% recorded the lowest (44.05 and 46.90) percent reduction of mite over untreated control.

Table 3: Efficacy of different acaricides against mite infesting okra (second spray)

Tr No.	Treatments	Concentration (%)	No. of mites/2 cm² leaf area					
			Days after spraying				Pooled over period	% reduction over untreated control
			1	5	9	14		
T_1	Fenazaquin 10 EC	0.016	1.09 (1.18)	0.92 (0.85)	0.98 (0.96)	1.05 (1.10)	1.01 (1.02)	91.93
T_2	Etoxazole 10 SC	0.008	2.25 (5.06)	1.98 (3.92)	2.00 (3.99)	2.06 (4.26)	2.07 (4.30)	66.03
T_3	Spiromesifen 22.9 SC	0.023	2.18 (4.74)	1.86 (3.45)	1.89 (3.59)	1.98 (3.91)	1.98 (3.91)	69.09
T_4	Spirotetramat 15.3 OD	0.018	1.66 (2.76)	1.43 (2.03)	1.46 (2.14)	1.47 (2.17)	1.51 (2.27)	82.08
T_5	Diafenthiuron 50 WP	0.060	1.73 (2.98)	1.48 (2.20)	1.55 (2.41)	1.61 (2.60)	1.59 (2.54)	79.91
T_6	Propergite 50 + Bifenthrin 5 SE	0.127	2.65 (7.03)	2.43 (5.89)	2.44 (5.95)	2.45 (5.98)	2.49 (6.20)	50.97
T_7	Spirotetramat 11.01 + Imidacloprid 11.01 SC	0.002	2.62 (6.85)	2.32 (5.37)	2.35 (5.52)	2.41 (5.82)	2.42 (5.88)	53.53
T_8	Fenpyroximate 5 SC	0.002	1.17 (1.37)	1.05 (1.11)	1.09 (1.19)	1.10 (1.22)	1.10 (1.22)	90.35
T_9	Bifenazate 22.6 SC	0.006	2.22 (4.92)	1.93 (3.74)	1.96 (3.83)	2.00 (4.01)	2.03 (4.11)	67.48
T_{10}	Untreated control	-	3.81 (14.53)	3.53 (12.47)	3.53 (12.45)	3.35 (11.24)	3.56 (12.65)	-
S.Em.±		T	0.12	0.10	0.10	0.12	0.03	-
		P	-	-	-	-	0.02	-
		T×P	-	-	-	-	0.11	-
C.D.at 5%		T	0.34	0.29	0.31	0.34	0.08	-
		P	-	-	-	-	0.05	-
		T×P	-	-	-	-	0.31	-
C.V.(%)		-	9.36	8.89	9.44	10.26	9.51	-

Note: Figures in parentheses are retransformed values; those outside are square root transformed values

Second spray

First day after spraying

The mean population of mite recorded at one day after second spray of different acaricidal treatments (Table 3) revealed that fenazaquin 10 EC 0.016% was found the most effective acaricide as it recorded the lowest mite population i.e., 1.18 mite/2 cm² however, it was statistically at par with the treatment fenpyroximate 5 SC 0.003% which registered 1.37 mite/2 cm² mite population. The treatment of propergite 50 + bifenthrin 5 SE 0.1265% was found least effective against mite as it showed 7.03 mite/2 cm² which was at par with the treatment spirotetramat 11.01 + imidacloprid 11.01 SC 0.02202% (6.85 mite/2 cm²).

Five days after spraying

The data presented in Table 3 indicated that the difference in mean mite population in various acaricidal treatments was found statistically significant. The mean mite population recorded five days after second spray of different acaricidal treatments revealed that fenazaquin 10 EC 0.016% recorded the lowest mite population i.e. 0.85 mite/2 cm². However, it was statistically at par with the treatments of fenpyroximate 5 SC 0.003% which registered 1.11 mite/2 cm² mite population. The treatment of propergite 50 + bifenthrin 5 SE 0.1265% was found least effective against mite as it showed 5.89 mite/2 cm² which was at par with the treatment spirotetramat 11.01 + imidacloprid 11.01 SC 0.02202% (5.37 mite/2 cm²).

Nine days after spraying

The data (Table 3) indicated that the treatment of fenazaquin 10 EC 0.016% recorded the lowest mite population i.e., 0.96 mite/2 cm². However, it was statistically at par with the treatments of fenpyroximate 5 SC 0.003% which registered 1.19 mite/2 cm² mite population. The treatment of propergite 50 + bifenthrin 5 SE 0.1265% was found least effective against mite as it showed 5.95 mite/2 cm² which was at par with the treatment spirotetramat 11.01 + imidacloprid 11.01 SC 0.02202% (5.52 mite/2 cm²).

Fourteen days after spraying

After fourteen days of second spray, similar trend of effectiveness of tested acaricides was recorded as it observed in first, fifth and nineth day after application (Table 3). Among the evaluated acaricides, fenazaquin 10 EC 0.016% recorded the lowest mite population i.e., 1.10 mite/2 cm². However, it was statistically at par with the treatments of fenpyroximate 5 SC 0.003% which registered 1.22 mite/2 cm² mite population.

Pooled over the second spraying

The mite population after pooled over the period of the second spray is presented in Table 3 revealed that in all the treatments, mite population reduced significantly over control. The treatment of fenazaquin 10 EC 0.016% was found to be the most effective, resulting in a significantly lower mite population of 1.02 mite/2 cm² which was at par with fenpyroximate 5 SC 0.003% which registered a mite population of 1.22 mite/2 cm².

Percent reduction over untreated control during second spray

Percent reduction over untreated control of mite after the second spray was calculated and presented in Table 3, it reveals that the highest percent reduction over untreated control was found in the treatment of fenazaquin 10 EC 0.016%, which recorded 91.93 percent reduction of mite population over untreated control. The next best treatments

were fenpyroximate 5 SC 0.003% and spirotetramat 15.3 OD 0.018% which recorded 90.35 and 82.08 percent reduction of mite over untreated control, respectively.

These findings are consistent with Wale *et al*. (2010)'s record, which showed that fenazaquin 10 EC @ 150 g.a.i./ha was found most effective for the control of mites on okra with the pest population of 3.87–12.60/leaf/plant as against 35.90–37.00/leaf/plant in untreated control. Misra (2011) revealed that fenazaquin 10 EC at 125 and 150 g a.i./ha registered significantly lowest mite population (3.5-4.8/4 cm2 leaf area). Siddhapara and Virani (2016) observed that abamectin (0.0025%) was significant over rest of treatments by registering significantly highest 91.47 percent reduction over rest of treatments and it was at par with fenazaquin (0.01%) and propergite (0.05%). Biswas *et al*. (2009) indicated that fenpyroximate 5 SC @ 500 ml/ha was found to be the best acaricide among all other acaricides available in controlling mites. Bhaskaran *et al*. (2007) reported that diafenthiuron 50 EC and 50 WP both at 450 g a.i./ha recorded the highest mean reduction of 87.95, 96.08 and 89.38, 93.79 percent in mite population after first and second round of spraying, respectively. Fenpyroximate 5 SC and fenazaquin 10 EC were next in order against *T. urticae* on okra at Coimbatore.

Yield and economics of different acaricides against mite infesting okra

Yield

The data on okra fruit yield harvested from the different treatments are summarized in Table 4 revealed that all acaricidal formulations recorded significantly higher yield than control. The highest fruit yield per hectare to all over treatment (10856 kg/ha) was harvested in the plot treated with fenazaquin 10 EC 0.016% and it was at par with fenpyroximate 5 SC 0.003% (10682 kg/ha) and spirotetramat 15.3 OD 0.018% (10121 kg/ha). Propergite 50 + bifenthrin 5 SE 0.1265% and spirotetramat 11.01 + imidacloprid 11.01 SC 0.02202% recorded yield of 6344 and 6628 kg/ha, respectively. However, the untreated plot recorded the lowest yield of 5821 kg/ha.

Table 4: Effect of various acaricidal treatments on fruit yield of okra (*kharif*, 2023)

Tr No.	Treatments	Fruit yield (kg/ha)	Total cost (₹/ha)	Gross realization (₹/ha)	Net realization (₹/ha)	CBR
T_1	Fenazaquin 10 EC	10856	4904	325689	151055	30.80
T_2	Etoxazole 10 SC	7242	6720	217253	42619	6.34
T_3	Spiromesifen 22.9 SC	8143	5810	244294	69660	11.99
T_4	Spirotetramat 15.3 OD	10121	6376	303642	129008	20.23
T_5	Diafenthiuron 50 WP	8582	5560	257445	82811	14.89
T_6	Propergite 50 + Bifenthrin 5 SE	6344	5416	190325	15690	2.90
T_7	Spirotetramat 11.01 + Imidacloprid 11.01 SC	6628	5270	198853	24219	4.60
T_8	Fenpyroximate 5 SC	10682	2220	320455	145821	65.69
T_9	Bifenazate 22.6 SC	7522	2400	225670	51035	21.26
T_{10}	Untreated control	5821	0	174634	0	0.00
S. Em.±		540.75	-	-	-	-
CD at 5%		1633.85	-	-	-	-
CV%		10.80	-	-	-	-

Economics of different acaricides against mite infesting okra

The results revealed that the net realization per hectare over untreated control was highest in the plot treated with fenazaquin 10 EC 0.016% (151055 ₹/ha), followed by fenpyroximate 5 SC 0.003% (145821 ₹/ha), spirotetramat 15.3 OD 0.018% (129008 ₹/ha), diafenthiuron 50 WP 0.060% (82811 ₹/ha), spiromesifen 22.9 SC 0.023% (69660 ₹/ha), bifenazate 22.6 SC 0.006% (51035 ₹/ha), etoxazole 10 SC 0.008% (42619 ₹/ha), spirotetramat 11.01 + imidacloprid 11.01 SC 0.02202% (24219 ₹/ha) and propergite 50 + bifenthrin 5 SE 0.1265% (15690 ₹/ha).

Looking to the cost benefit ratio (CBR) was calculated from the plots treated, fenpyroximate 5 SC 0.003% stood first (1:65.69), followed by fenazaquin 10 EC 0.016% (1:30.80). The order of CBR of the treatments were bifenazate 22.6 SC 0.006% (1:21.26), spirotetramat 15.3 OD 0.018% (1:20.23), diafenthiuron 50 WP 0.060% (1:14.89) and spiromesifen 22.9 SC 0.023% (1:11.99). Rest of the treatments *viz*., Etoxazole 10 SC 0.008% (1:6.34), spirotetramat 11.01 + imidacloprid 11.01 SC 0.02202% (1:4.60) and propergite 50 + bifenthrin 5 SE 0.1265% (1:2.90) exhibited lower CBR and were deemed less economically viable.

Conclusion

Out of the nine acaricidal treatments evaluated, fenazaquin 10 EC 0.016% provedto be the most effective against okra mite. It exhibited the lowest mite population,maximum fruit yield, highest yield increase over the untreated control and thehighest net realization.Among the various acaricidal treatments, fenpyroximate 5 SC 0.003% obtained thehighest CBR (Cost Benefit Ratio) of 1:65.69, followed by fenazaquin 10 EC 0.016% with CBR of 1:30.80.

References

1. Anonymous. Area and production, 2022-23. Horticultural cultivation of crops, area and production Statistics Division, Director of Horticulture, Agriculture, Farmers Welfare and Cooperation Department, Government of Gujarat [Internet]; c2023 [cited 2024 Jun 2]. Available from: http://doh.gujarat.gov.in/horticulture-census.htm
2. Benjawan C, Chutichudet P, Kaewsit S. Effect of green manures on growth, yield and quality of green okra (*Abelmoschus esculentus* L.) Har Lium Cultivar. Pak J Biol Sci. 2007;10(7):1028-1035.

3. Bhaskaran EV, Ramaraju K, Gunasekaran K. Evaluation of new acaricides against two-spotted spider mite, *Tetranychus urticae* Koch on bhendi. Pestology. 2007;31(12):31-34.
4. Biswas K, Mallikarjunappa S, Koneripalli N, Goswami TN. Superiority of fenpyroximate 5 SC over other available acaricides against chilli yellow mite, *Polyphagotarsonemus latus*. Resist Pest Manag Newsl. 2009;19(1):19-20.
5. Misra HP. Bio-efficacy of fenazaquin 10 EC against two-spotted spider mite, *Tetranychus urticae* Koch. (Acari: Tetranychidae) in tomato. Pest Manag Hortic Ecosyst. 2011;17(1):19-22.
6. Rachna G. Incidence of *Tetranychus cinnabarinus* (Boisd.) infestation in different varieties of *Abelmoschus esculentus* (L.). Ann Plant Prot Sci. 2004;12(1):45-47.
7. Rao PU. Chemical composition and biological evaluation of okra (*Hibiscus esculentus*) seeds and their kernels. Plant Foods Hum Nutr. 1985;35(4):389-396.
8. Saifullah M, Rabbani MG. Evaluation and characterization of okra (*Abelmoschus esculentus* Moench.) genotypes. SAARC J Agric Tissue Cult. 2009;7(1):92-99.
9. Showkat A, Bhagat RM, Ishtiyaq A, Amit K. Pest complex and their succession on okra, *Abelmoschus esculentus* (L.) Moench. Haryana J Hortic Sci. 2010;39(1-2):169-171.
10. Siddhapara MR, Virani VR. Efficacy of acaricides against two-spotted spider mite, *Tetranychus urticae* Koch on okra. J Exp Zool India. 2016;19(1):1581-1588.
11. Srinivasa R, Rajendran R. Joint action potential of neem with other plant extracts against the leaf hopper *Amrasca devastans* (Distant) on okra. Pest Manag Econ Zool. 2003;10:131-136.
12. Wale SD, Kadu RV, Landge SA, Chandele AG. Evaluation of magister (Fenazaquin 10 EC) against mites on Okra. Bioinfolet. 2010;7(4):304-305.