Research Article

EVALUATION OF ECO-FRIENDLY AGENTS AGAINST, RED SPIDER MITE *TETRANYCHUS URTICAE* KOCH ON OKRA

Baskaran, V.[1*] and V. Sathyaseelan[2]

[1]*Institute of Agriculture, Tamil Nadu Agricultural University, Kumulur, Tamil Nadu, INDIA*

[2]*Department of Agricultural Entomology, Faculty of Agriculture, Annamalai University, Chidambaram, Tamil Nadu, INDIA*

**Corresponding author's E-mail: varadharajbhaskaran@gmail.com*

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ABSTRACT

Field experiment was conducted to evaluate the efficacy of eco-friendly agents and acaricides against bhendi red spider mite *Tetranychus urticae* Koch with six treatments including were assessed in the field trial at Paniyapuram village, Trichy using Mahyco hybrid variety in RBD with three replications. Pre count ranges from 12 to 12.90 mites/ cm^2. The results revealed that, fenazaquin 10 EC 1 ml/l effected 67.63 per cent reduction of mite population, Bifenthrin recorded 61.48 per cent reduction over control followed by Azadirachtin 1% (45.18 %), Mahua oil + Neem oil 3 % (40.74 %) and Neem Oil 3% (31.09 %) were also found to be effective by recording a mean reduction percentage up to 15 DAT (Days after treatment). The results of the second round revealed that, fenazaquin 10 EC 1 ml/l effected 90.79, 90.00, 88.24, and 88.24 per cent reduction of mite population at 3, 7, 10 and 14 Days after treatment respectively. Bifenthrin 10 EC 100 g a.i. ha^{-1}, Azadirachtin 1% and Mahua oil + Neem oil 3 % were also found to be effective by recording a mean reduction percentage of 89.26, 84.05 and 68.40 respectively, up to 15 DAT after two rounds of spraying. In Neem oil the per cent reduction of mite population ranged from 60.00 to 64.47. The highest yield was recorded 10.85 kg/ plot in the fenazaquin 10 EC 1 ml/l treated. (Table 1 – 3).

INTRODUCTION

Okra is an important annual commercial crop of India. Mite species belonging to the genus Tetranychus cause severe loss in the yield of okra fruits. *Tetranychus urticae* Koch. have been reported as the important mite pest of vegetable crops.

Tetranychid mites are commonly called as spider mites. They are found throughout the world on virtually every major food crops and ornamental plants. *Tetranychid* mites are green, yellow, orange or red in color and often are found associated with fine silk webbing which the mites spin from glands located in the palpi. Feeding of spider mites resulted in white specks on leaves which later coalesce and produce white patches resulting in reduced photosynthetic activity (Grandjean, 1948). Repeated use of insecticides at short intervals is uneconomical besides environmentally unsafe. Hence, it is imperative to search for alternative safer chemicals that are economical and eco-friendly in nature. Moreover, there is no work on the effect of acaricides of recent origin in Tamil Nadu.

MATERIALS AND METHODS

Field experiment (first) was conducted in the Paniyapuram village, Trichy district to assess the efficacy of ecofriendly agents and new acaricides against two spotted spider mite during February 2019 – April 2019. The treatments *viz*., neem oil 3 %, Neem oil 3 %, Mahua oil + Neem oil 3 %, Azardirachtin 10000 ppm, Bifenthrin 10 EC 100 g a.i., Fenazaquin 125 g ha^{-1} and an untreated check. The variety used was Mahyco hybrid. The experiment was conducted in a randomized block design with three replications. Two sprayings were given using high volume sprayer. Pre-treatment and post treatment observations on the egg and mobile stages of mite population on terminal, middle and bottom leaves of the plants on 3, 7, 10 and 14 days after spraying (DAT) using a 1 x 1 cm window hole counting template method.

Statistical Analysis

Statistical analyses of experimental results mean values were subjected to data transformation by square root transformation for population count, One way ANOVA was

performed to get pooled analysis of all the factors under study.

Table 1. Effect of botanicals and acaricides against spider mite, *Tetranychus urticae* on bhendi

Treatments	Number of mites / cm^2 – Days after first spraying									Pooled mean	Mean % Redn.
	Pre Count	3	% Redn.	7	% Redn.	10	% Redn.	14	% Redn.		
Neem oil 3 %	12.38	10.90 (3.30)	26.10	10.95 (3.31)	30.48	10.95 (3.31)	30.48	11.48 (3.39)	36.25	11.07 (3.33)	31.09
Mahua oil + Neem oil 3 %	12.00	8.68 (2.95)	41.19	9.58 (3.09)	39.21	9.58 (3.09)	39.21	10.25 (3.20)	43.06	9.52 (3.09)	40.74
Azardirachtin 10000 ppm	12.90	8.68 (2.95)	41.19	8.90 (2.98)	43.49	8.90 (2.98)	43.49	8.75 (2.96)	51.39	8.81 (2.97)	45.18
Bifenthrin 10 EC 100 g a.i. ha^{-1}	12.65	5.45 (2.33)	63.05	6.15 (2.48)	60.95	6.15 (2.48)	60.95	7.00 (2.65)	61.11	6.19 (2.49)	61.48
Fenazaquin 125 g	12.50	4.95 (2.22)	66.44	5.05 (2.25)	67.94	5.05 (2.25)	67.94	5.75 (2.40)	68.06	5.20 (2.28)	67.63
Control	12.50	14.75 (3.84)	0.00	15.75 (3.97)	0.00	15.75 (3.97)	0.00	18.00 (4.24)	0.00	16.06 (4.01)	0.00
SEM		0.16		0.28		0.21		0.18		0.12	
SED		0.23		0.40		0.30		0.25		0.18	
CD 0.05		0.47		0.82		0.62		0.51		0.37	
CD 0.01		0.63		1.11		0.85		0.69		0.50	

Table 2. Effect of botanicals and acaricides against spider mite, *Tetranychus urticae* on bhendi

Treatments	Number of mites / cm^2 - Days after second spraying								Pooled mean	Mean % Redn	Cumulative mean	Mean % Redn.	Mean Yield of 10 picking (kg.)/ plot
	3	% Redn	7	% Redn	10	% Redn	14	% Redn					
Neem oil 3 %	6.75 (2.60)	64.47	7.50 (2.74)	62.50	8.50 (2.92)	60.00	8.50 (2.92)	60.00	7.81 (2.80)	61.66	9.44	48.18	7.70
Mahua oil + Neem oil 3 %	6.00 (2.45)	68.42	6.25 (2.50)	68.75	6.75 (2.60)	68.24	6.75 (2.60)	68.24	6.44 (2.54)	68.40	7.62	58.16	8.10
Azardirachtin 10000 ppm	2.75 (1.66)	85.53	3.25 (1.80)	83.75	3.50 (1.87)	83.53	3.50 (1.87)	83.53	3.25 (1.80)	84.05	5.57	69.42	8.55
Bifenthrin 10 EC 100 g a.i. ha^{-1}	1.75 (1.32)	90.79	2.00 (1.41)	90.00	2.50 (1.58)	88.24	2.50 (1.58)	88.24	2.09 (1.48)	89.26	4.72	74.10	9.15
Fenazaquin 100 g a.i. ha^{-1}	1.75 (1.32)	90.79	1.75 (1.32)	91.25	1.50 (1.22)	92.94	1.50 (1.22)	92.94	1.63 (1.27)	92.02	3.50	80.79	10.85
Control	19.00 (4.36)	0.00	20.00 (4.47)	0.00	21.25 (4.61)	0.00	21.25 (4.61)	0.00	20.38 (4.51)	0.00	18.22	0.00	6.40
SEM	0.16		0.28		0.21		0.18		0.12				
SED	0.23		0.40		0.30		0.25		0.18				
CD 0.05	0.47		0.82		0.62		0.51		0.37				
CD 0.01	0.63		1.11		0.85		0.69		0.50				

Per cent reduction: Per cent reduction over control

Figures in the parentheses are square root transformed values

RESULTS AND DISCUSSION

Pre count ranges from 12 to 12.90 mites/ cm^2. The results revealed that, fenazaquin 10 EC 1 ml/l effected 67.63 per cent reduction of mite population, Bifenthrin recorded 61.48 per cent reduction over control followed by Azadirachtin 1% (45.18 %), Mahua oil + Neem oil 3 % (40.74 %) and Neem Oil 3% (31.09 %) were also found to be effective by recording a mean reduction percentage up to 15 DAT (Days

after treatment). The results of the second round revealed that, fenazaquin 10 EC 1 ml/l effected 90.79, 90.00, 88.24, and 88.24 per cent reduction of mite population at 3, 7, 10 and 14 Days after treatment respectively. Bifenthrin 10 EC 100 g a.i. ha^{-1}, Azadirachtin 1% and Mahua oil + Neem oil 3 % were also found to be effective by recording a mean reduction percentage of 89.26, 84.05 and 68.40 respectively, up to 15 DAT after two rounds of spraying. In Neem oil the per cent reduction of mite population ranged from 60.00 to 64.47. The highest yield was recorded 10.85 kg/ plot in the fenazaquin 10 EC 1 ml/l treated. (Table 1–3). The efficacy of different botanicals on the population of the mite under field condition is presented in the Table 1. Among the botanicals tested, the per cent reduction in mite population was the lowest in the Azardirachtin recorded the highest reduction of 41.19, 43.49, 43.49 and 51.39 per cent reduction of mite population at 3, 7, 10 and 14 DAT respectively, followed by mahua oil + neem oil 3 % and neem oil 3 % were next in order and are significantly different with each other (Table 1). Azardirachtin recorded highest mean mite population 14 days after first spraying (45.18 %) and (69.42 %) after second spraying.

The acaricidal property of neem leaf extract has already been reported by Pande *et al.* (1991) and Yathiraj and Jagadish (1999). The reduction in the mite population may be due to antifeedant effect of plant products. Use of plant products may be encouraged since they are very safe to natural enemies of mite pests and also eco-friendly in nature. The initial population of predatory mites before spraying ranged between 0.83 and 1.50/leaf in all treatments. The results revealed that, Azardirachtin, mahua oil + neem oil 3 % effected 52 per cent reduction of mite population. Bifenthrin 10 EC 100 g a.i. ha^{-1}, Fenazaquin, were also found to be effective by recording a mean per cent reduction percentage of 54.00, and 56.00, mean reduction in mite population over control respectively (Table 3). The neem-based product Natuneem at 0.25 and 1.0% caused unsatisfactory mortality (40–56%) of *T. urticae* at 72 HAA when applied on bean leaves (*C. ensiformis*) as reported by Daniel *et al.*, 2012 was found in accordance with the result. The highest yield was recorded 10.85 kg/ plot in the fenazaquin 10 EC 1 ml/l treated.

Table 3. Effect of botanicals and acaricides against predator mite, in bhendi

Treatments	Pre count	Number of mites/ leaf - Days after second spraying								Pooled mean	Mean % Redn.
		3	% Redn	7	% Redn	10	% Redn	14	% Redn.		
Neem oil 3 %	1.33	1.17 (1.08)	22.22	1.00 (1.00)	53.85	1.17 (1.08)	50.00	1.33 (1.15)	42.86	1.17 (1.08)	44.00
Mahua oil + Neem oil 3 %	0.83	1.17 (1.08)	22.22	1.00 (1.00)	53.85	1.00 (1.00)	57.14	0.83 (0.91)	64.29	1.00 (1.00)	52.00
Azardirachtin 10000 ppm	1.50	1.17 (1.08)	22.22	1.00 (1.00)	53.85	1.00 (1.00)	57.14	0.83 (0.91)	64.29	1.00 (1.00)	52.00
Bifenthrin 10 EC 100 g a.i. ha^{-1}	1.50	1.33 (1.15)	11.11	0.67 (0.82)	69.23	0.50 (0.71)	78.57	1.33 (1.15)	42.86	0.96 (0.98)	54.00
Fenazaquin 125 g	1.33	0.67 (0.82)	55.56	0.67 (0.82)	69.23	0.83 (0.91)	64.29	1.50 (1.22)	35.71	0.92 (0.96)	56.00
Control	1.50	1.50 (1.22)	0.00	2.17 (1.47)	0.00	2.33 (1.53)	0.00	2.33 (1.53)	0.00	2.08 (1.44)	0.00

Per cent reduction: Per cent reduction over control

Figures in the parentheses are square root transformed values

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