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Bio Efficacy of Certain Botanical Extracts, Oils and Acaricide Against Two Spotted Spider Mites [*Tetranychus urticae* (Koch)] on Okra

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Field and pot culture experiments were conducted Annamalai University, Tamil Nadu, India during 2012 - 2013 to evaluate the bio efficacy of certain botanical extracts, oils and acaricides against two spotted spider mite (TSSM) *Tetranychus urticae* (Koch) on okra. *Vitex negundo* leaf extract, *Clerodendron inermea* leaf extract, *Wedelia chinensis* leaf extract, Neem oil, *Pungam oil, Pinnai oil,*

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Illupai oil, NSKE, Dicofol and Fenezaquin were used for the study. The maximum mite population was observed in 5% *W. chinensis* leaf extract (15.08) sprayed plants followed by, 5% *C. inermea* leaf extract (13.95), 3% *illupai oil* (11.86) and NSKE 5% (11. 67) respectively. Amoderate mite population was observed in 5% *V. negundo* leaf extract (10.70), 3% *pungam oil* (10.05), 3% *pinnai oil* (9.53) and 3% neem oil (9.05) sprayed plants respectively. Whereas the least mite population was observed in dicofol 0.2% (8.13) and fenezaquin 0.2% (8.01) sprayed okra plants.

Keywords: Two spotted spider mite; tetranychus urticae; okra; botanical extract; fenezaquin 0.2%.

1. INTRODUCTION

Okra, *Abelmouschus esculentus* Moench (L.) is a prime vegetable crop of tropical and subtropical part of the world. It is consumed for its high nutritional value owing to high contents of vitamins A, B and C and minerals like calcium, iron, magnesium and potassium. The bhendi crop is attacked by several major and minor insect and mite pests. Many species of *Tetranychid* mite *viz*., *Tetranychus urticae* Koch*. T. cinnabarinus* (Boisd.), *T. ludeni* (Zacher), *T. neocaledonicus* (Andre) and*T. Macfarlanei* Baker & Pritchard, (Acari: Tetranychidae) reported to attack the crop severely. In Bihar, mites are reported to causes losses to the extent varying from 36.8 % to 83.2 % in different vegetable crop (Benchasri, 2012). These mites have also developed resistance to many acaricides. Hence it is imperative to search for alternative safer biopesticides that are economical and ecofriendly in nature nature (Kumar *et al*., 2021; Bhullar et al., 2021). Moreover, very meager work was reported on the effect of indigenous biopesticides of plant origin against mites. Hence the present study was under taken to study the bio efficacy of certain botanical extracts, oils and some effective acaricides on the management of two spotted spider mite.

2. MATERIALS AND METHODS

Fresh plant leaves extracts were prepared from three widely used plants viz. *Wedilea chinensis* L. (Family: Asteraceae), *Clerodendran inermea* L. (Family: Verbenaceae) and *Vitex negundo* L. (Family: Verbenaceae).

2.1 Preparation of Leaf Extracts

Fresh leaves of *Vitex negundo* L.(Indian Pivet), *Clerodendron inermea* L.(Kashmir bouquet) and *Wedilea chinensis* L. (Chinese wedilea) were collected, washed with running tap water to remove dirt and kept under shade to remove the excess moisture on the leaves. The leaves were chopped into small pieces with a sharp knife. Hundred grams of chopped material was crushed into a fine paste using a mixer grinder. The paste thus obtained was diluted with small quantity of water (600- 700 ml) and kept for overnight. The next day the suspension was filtered through muslin cloth and also filtered through a sterilized Whatmann No. 1 filter paper, volume was made up to one litre. The filterate obtained was a pure botanical extract. The concentration of the suspension so prepared was 10 per cent. From this suspension, 5 per cent concentration was prepared by mixing water and stored in a close container for further use. (Baskaran and Narayanasamy 1995).

Neem oil, *pungam* oil, *pinnai* oil and *illupai* oil were obtained from local market and required specific concentrations were prepared by the dilution technique and 0.05 per cent soap solution was added to the oil as an emulsifying agent for getting uniform mixture.

2.2 Preparation of NSKE – Neem Seed Kernel Extract

Neem seeds were collected from neem tree, washed thoroughly in the running tap water till the adhered fruit particles were removed away. The neem seeds were shade dried for few days. The outer rind of the seed was broken and kernels gathered. It was ground well by means of a blender or mixer grinder, to make into powder form. About 20 litre of pure water and 15 ml of soap solution or 0.1% Teepol was added. This setup was kept undisturbed for overnight, and next morning, it was blended well and filtered through muslin cloth and used for spraying. (Sathyaseelan and Bhaskaran (2009).

2.3 Pot Culture Experiment

The pot culture experiment was carried out in the pot culture yard at Department of Agrl. Entomology, Faculty of Agriculture, Annamalai University, Annamalai Nagar during 2011 – 2012, using potted plants of okra (var: Arka Anamika) at 27 ± 2^{o} C with 80 ± 5 % relative humidity. Each

pot was filled with 8 kg of potting mixture and five seeds of okra were sown in each pot. The experiment was conducted in a randomized block Design (RBD) with 11 treatments *viz*. 3% neem oil, 3% *pungam oil*, 3% *pinnai oil*, 3% *illupai oil*, NSKE – neem seed kernel extract 5%, 5% *V. negundo* leaf extract, 5% *C. inermea* leaf extract, 5%, *W. chinensis* leaf extract, dicofol 18.5 EC 0.2 %, fenazaquin10 EC 0.2 % and an untreated check was also maintained. Before spray, the pre-count was recorded in all the treatments including the untreated check and each treatment was replicated four times. One round of foliar spray was given and the red spider mite population was recorded at specific time interval of 3, 5, 7, 10 and 14 days after spray (DAS). Similarly, second round of spray was given to the potted plants, and observations were recorded as that of the first spray.

2.4 Field Experiment

The field experiment was carried out at Perampattu village, Chidambaram taluk, Cuddalore District Tamil Nadu, India during 2012 – 2013. Using okra, Cv. *Arka Anamika*. The field was ploughed four to five times, and at the last ploughing, 1.5 tonnes of farm yard manure / 640 m^2 was applied and incorporated thoroughly. Ridges and furrows were formed at 45 cm interval. The seeds were sown on one side of the ridges at the rate of 2 seeds / hill spaced at 35 cm apart.

The experiment was conducted in a randomized block Design (RBD) with 11 treatments *viz*. neem oil 3%, *pungam oil* 3%, *pinnai oil* 3%, *illupai oil* 3%, NSKE – neem seed kernel extract 5%, *V. negundo* leaf extract 5%, *C. inermea* leaf extract 5%, *W. chinensis* leaf extract 5%, fenazaquin 10 EC 0.2 %, dicofol 18.5 EC 0.2 % and an untreated check was also maintained. Before spray, the pre-count was recorded in all the treatments including the untreated check and each treatment was replicated four times. One round of foliar spray was given and the red spider mite population was recorded at specific time interval of 3, 5, 7, 10 and 14 days after spray. Similarly, second round of spray was given to the bhendi field, and observations were recorded as that of the first spray (DAS). For the assessment of mite population, randomly three leaves representing top, middle and bottom regions were selected from each plant and the number of nymphs and adult mites per 2sq.cm was recorded using zooming hand lens (Vinoth Kumar *et al.,* 2009).

2.5 Statistical Analysis

Experimental data on the mite population were transformed into square root transformed values and were subjected to statistical analysis. All the treatments were replicated four times. The means were separated using LSD at $P < 0.05$.

3. RESULTS AND DISCUSSION

Certain botanical extracts, oils and acaricides were tested against *T. urticae* Koch. on okra under pot culture experiment. Before treatment the mite population per plant ranged from 14.00 and 20.25 (Table 1). On the third day after first spray, minimum mite population was observed in neem oil 3% sprayed plans followed by fenazaquin 10 EC 0.2%. A similar trend was observed on the mite population during 3, 5, 7 and 10 days after spraying. Second week after first spray, minimum mite population was observed in neem oil 3% sprayed plans followed by fenazaquin 10 EC 0.2%.

Based on pooled mean data after 14 days of first spraying, the maximum mite population was observed in neem oil 3% sprayed plants. Whereas the least pooled mean of mite population was observed in dicofol 18 EC 0.2 % and fenazaquin 10 EC 0.2% sprayed plants (Table 1). Similar trend was also observed after second spraying on okra against two spotted spider mite under pot culture experiment. Similar observation reported by Yathiraj and Jagadish (1999); Ramaraju (2004). Kumar and Singh (2004); Rai *et al.,* (2010) and Gauraha and Singh (2011). Among the acaricides tested, fenazaquin 10 EC recorded a maximum yield of 242.40 grams of okra fruits per plant which was followed by dicofol 18.5 EC 232.16 and neem oil 3% 225.35 grams of fruits per plant. Fenazaquin 10 EC and dicofol 18.5 EC significantly reduced the mite population on okra after two rounds of spraying with increased yield (Table 2).

When certain botanical extracts, oils and acaricides were tested against *T. urticae* on okra under field condition. Initial population before treatment application ranged from 14.75 and 18.00 (Table 3). On the third day after first spray, the maximum mite population was observed in neem oil 3% sprayed plants. Whereas the least mite population was observed in fenazaquin 10 EC 0.2% sprayed okra plants. Similar trend was observed on 5, 7, 10 and 14 days after first spray (Jeyarani *et al*. 2010, Kumar and Singh 2003 Kumar *et al*. 2024).

Table 1. Population of two spotted spider mite on bhendi plants sprayed with certain botanical extracts, oils and acaricides under pot culture conditions (First spray)

Sl. No	Treatments	Conc. (%)	Pre count (Nos / 4 Sq. cm)	Mean number of red spider mite / 4 Sq. cm					Pooled mean
				3 DAS	5 DAS	7 DAS	10 DAS	14 DAS	
			15.50	4.50	7.25	9.75	12.25	14.50	10.62
T_1	Neem oil	3%	(4.00)	(2.23)	(2.78)	(3.19)	(3.57)	(3.87)	(3.05)
			14.25	5.50	8.25	11.25	15.25	18.00	12.08
T_2	*Pungam oil*	3%	(3.83)	(2.44)	(2.95)	(3.42)	(3.96)	(4.30)	(3.16)
			15.25	4.75	7. 50	11.00	12.75	14.75	11.00
T_3	*Pinnai oil*	3%	(3.96)	(2.28)	(2.82)	(3.39)	(3.63)	(3.90)	(3.12)
			14.00	6.50	9.25	12.75	17. 25	21. 50	13.54
T_4	*Illupai oil*	3%	(3.80)	(2.64)	(3.11)	(3.64)	(4.21)	(4.69)	(3.30)
			15.00	6.00	8.75	12.50	17.00	20.00	13.20
T_5	NSKE	5%	(3.93)	(2.54)	(3.03)	(3.60)	(4.18)	(4.52)	(3.28)
			16.00	5.75	8.50	12.25	16.25	19.75	13.08
T_6	*V. negundo*	5%	(4.06)	(2.49)	(2.99)	(3.57)	(4.09)	(4.50)	(3.28)
			14.50	8.25	12.50	14.75	16.50	18.75	14.20
T_7	*C. inermea*	5%	(3.87)	(2.95)	(3.60)	(3.90)	(4.12)	(4.38)	(3.58)
			14.75	10.25	13.25	16.50	18.50	21.50	15.79
T_8	*W. chinensis*	5%	(3.90)	(3.27)	(3.70)	(4.12)	(4.35)	(4.69)	(3.75)
			15.75	3.25	6.25	7.75	9.50	12.75	9.20
T_9	Dicofol 18.5 EC	0.2%	(4.03)	(1.93)	(2.59)	(2.86)	(3.16)	(3.63)	(2.85)
			16.25	2.50	4.75	6.00	7.25	11.75	8.08
T10	Fenazaquin10 EC	0.2%	(4.09)	(1.72)	(2.27)	(2.55)	(2.78)	(3.49)	(2.66)
			20.25	23.25	26.25	28.75	32.00	35.75	27.70
T_{11}	Control	-	(4.55)	(4.87)	(5.17)	(5.40)	(5.70)	(6.02)	(5.00)
	C.D.(p=0.05)	-	0.13	0.16	0.21	0.16	0.09	0.17	0.50

**DAS – Days after spray *Mean of four replications *Figs. in parentheses are square root transformed values *Means followed by the common letter(s) are not significantly different at 5% level by LSD*

Table 2. Population of two spotted spider mite on bhendi plants sprayed with certain botanical extracts, oils and acaricides under pot culture conditions (Second spray)

Sl. No	Treatments	Conc. (%)	Mean number of red spider mite / 4 Sq. cm					Pooled mean	Cumulative mean	Yield /plant^{-1} (g)
			3 DAS	5 DAS	7 DAS	10 DAS	14 DAS			
T_1	Neem oil	3%	5.25 (2.39)	8.25 (2.95)	10.25 (3.27)	12.50 (3.60)	15.75 (4.03)	10.40 (3.06)	10.51	225.35
T_2	*Pungam oil*	3%	6.50 (2.64)	8.75 (3.03)	11.50 (3.46)	16.50 (4.12)	19.00 (4.41)	12.45 (3.31)	12.26	205.54
T_3	*Pinnai oil*	3%	5.75 (2.49)	8.50 (2.99)	11.00 (3.39)	13.00 (3.67)	16.00 (4.06)	10.85 (3.14)	10.92	210.75
T_4	*Illupai oil*	3%	7.25 (2.78)	10.25 (3.26)	13.50 (3.74)	17.25 (4.21)	21.25 (4.66)	13.90 (3.50)	13.72	196.10
T_5	NSKE	5%	7.00 (2.73)	9.50 (3.15)	13.25 (3.70)	17.00 (4.18)	20.25 (4.55)	13.40 (3.44)	13.30	198.52
T_6	*V. negundo*	5%	6.75 (2.68)	9.25 (3.12)	12.25 (3.57)	16.75 (4.15)	19.75 (4.49)	12.95 (3.38)	13.01	199.54
T_7	*C. inermea*	5%	9.25 (3.12)	13.50 (3.74)	15.75 (4.03)	18.25 (4.33)	23.00 (4.84)	15.95 (3.80)	15.07	183.75
T_8	*W. chinensis*	5%	11.75 (3.49)	13.75 (3.77)	16.50 (4.12)	18.75 (4.38)	23.75 (4.92)	16. 90 (3.94)	16.34	173.35
T_9	Dicofol 18.5 EC	0.2%	3.75 (2.04)	6.50 (2.64)	7.25 (2.78)	9.75 (3.19)	12.75 (3.63)	8.00 (2.67)	8.60	232.16
T_{10}	Fenazaquin 10 EC	0.2%	3.00 (1.87)	5.75 (2.49)	6.25 (2.59)	8.50 (2.99)	11.75 (3.49)	7.05 (2.49)	7.56	242.40
T_{11}	Control	-	23.25 (4.87)	27.50 (5.29)	29.75 5.50)	33.75 (5.85)	36.75 (6.10)	30.20 (5.37)	28.95	132.42
	C.D.(p=0.05)	-	0.17	0.23	0.17	0.14	0.15	0.16	-	-

**DAS – Days after spray *Mean of four replications *Figs. in parentheses are square root transformed values *Means followed by the common letter(s) are not significantly different at 5% level by LSD*

Table 3. Population of two spotted spider mite on bhendi plants sprayed with certain botanical extracts, oils and acaricides under field conditions (First spray)

Sl. No	Treatments	Conc. (%)	Pre count (Nos / 4 Sq. cm)	Mean number of red spider mite / 4 Sq. cm					Pooled mean
				3 DAS	5 DAS	7 DAS	10 DAS	14 DAS	
T_1	Neem oil	3%	16.50	4.25	6.50	8.25	9.75	11.50	9.45
			(4.12)	(2.17)	(2.64)	(2.95)	(3.20)	(3.46)	(2.97)
T_2	*Pungam oil*	3%	14.75	4.75	7.50	10.25	11.50	12.75	10.25
			(3.90)	(2.28)	(2.82)	(3.27)	(3.46)	(3.64)	(3.07)
T_3	*Pinnai oil*	3%	15.25	4.50	7.25	8.75	11. 25	12.25	9.87
			(3.96)	(2.23)	(2.78)	(3.04)	(3.42)	(3.57)	(3.00)
T_4	*Illupai oil*	3%	15.00	6.50	9.50	12.50	13.00	14.50	11.83
			(3.93)	(2.64)	(3.15)	(3.60)	(3.67)	(3.87)	(3.33)
T_5	NSKE	5%	17.00	6.00	8.25	11.25	12.25	14.00	11.45
			(4.18)	(2.54)	(2.95)	(3.42)	(3.57)	(3.80)	(3.28)
T_6	*V. negundo*	5%	16.75	5.50	7.75	10.75	11.75	13.25	10.95
			(4.15)	(2.44)	(2.87)	(3.35)	(3.49)	(3.70)	(3.20)
T_7	*C. inermea*	5%	16.25	9.75	10.75	13.75	15.50	17.50	13.91
			(4.09)	(3.19)	(3.35)	(3.77)	(4.00)	(4.24)	(3.60)
T_8	*W. chinensis*	5%	15.50	10.75	11.75	14.25	17.50	18.00	14.62
			(3.99)	(3.35)	(3.49)	(3.84)	(4.24)	(4.30)	(3.67)
T_9	Dicofol 18.5 EC	0.2%	17.50	3.50	5.50	7.75	9.25	11.25	9.12
			(4.24)	(1.99)	(2.44)	(2.87)	(3.12)	(3.42)	(2.89)
T_{10}	Fenazaquin 10 EC	0.2%	18.00	3.25	5.25	7.25	8.75	10.75	8.87
			(4.30)	(1.93)	(2.39)	(2.78)	(3.04)	(3.35)	(2.85)
T_{11}	Control	-	16.25	17.25	20.50	22.50	23.25	27.25	21.16
			(4.09)	(4.21)	(4.58)	(4.79)	(4.87)	(5.26)	(4.42)
	C.D.(p=0.05)	-	0.12	0.17	0.12	0.07	0.07	0.08	0.50

DAS – Days after spray; Mean of four replications; Figs. in parentheses are square root transformed values; Means followed by the common letter(s) are not significantly different at 5% level by LSD

Table 4. Population of two spotted spider mite on bhendi plants sprayed with certain botanical extracts, oils and acaricides under field conditions (Second spray)

Sl. No	Treatments	Conc. (%)	Mean number of red spider mite / 4 Sq. cm					Pooled mean	Cumulative mean	Yield (kgs/ plot/ 10 pickings)
			3 DAS	5 DAS	7 DAS	10 DAS	14 DAS			
T_1	Neem oil	3%	4.50	6.75	8.50	11.25	12.25	8.65		
			(2.23)	(2.69)	(2.99)	(3.42)	(3.57)	(2.83)	9.05	21.08
T_2	*Pungam oil*	3%	5.75	7.50	9.75	12.75	13.50	9.85		
			(2.49)	(2.82)	(3.20)	(3.64)	(3.74)	(3.04)	10.05	20.58
T_3	*Pinnai oil*	3%	5.50	7.00	9.25	11.50	12.75	9.20		
			(2.44)	(2.73)	(3.11)	(3.46)	(3.64)	(2.94)	9.53	20.74
T_4	*Illupai oil*	3%	6.75	10.00	13.00	14.25	15.50	11.90		
			(2.69)	(3.23)	(3.67)	(3.84)	(4.00)	(3.36)	11.86	18.89
T_5	NSKE	5%	6.50	9.25	12.25	13.75	14.75	11.30		
			(2.64)	(3.12)	(3.57)	(3.77)	(3.90)	(3.27)	11.67	19.54
T_6	*V. negundo*	5%	6.25	7.75	11.25	13.25	13.75	10.45		
			(2.59)	(2.87)	(3.42)	(3.70)	(3.77)	(3.15)	10.70	19.75
T_7	*C. inermea*	5%	10.50	11.75	14.25	16.25	17.25	14.00		
			(3.31)	(3.49)	(3.84)	(4.09)	(4.21)	(3.68)	13.95	17.91
T_8	*W. chinensis*	5%	11.75	12.75	15.50	18.50	19.25	15.55		
			(3.49)	(3.64)	(4.00)	(4.35)	(4.44)	(3.87)	15.08	16.63
T_9	Dicofol 18.5 EC	0.2%	3.75	6.50	7.25	9.25	12.75	7.90		
			(2.05)	(2.64)	(2.78)	(3.12)	(3.64)	(2.65)	8.13	21.91
T_{10}	Fenazaquin 10 EC	0.2%	3.50	5.75	6.25	8.50	11.75	7.15		
			(1.99)	(2.49)	(2.59)	(2.99)	(3.49)	(2.52)	8.01	22.62
T_{11}	Control	-	17.50	22.75	23.50	24.25	35.75	26.75		
			(4.24)	(3.76)	(4.89)	(4.97)	(6.02)	(4.97)	23.96	15.31
	C.D.(p=0.05)	-	0.10	0.09	0.13	0.06	0.05	0.31	-	-

DAS – Days after spray; Mean of four replications; Figs. in parentheses are square root transformed values; Means followed by the common letter(s) are not significantly different at 5% level by LSD

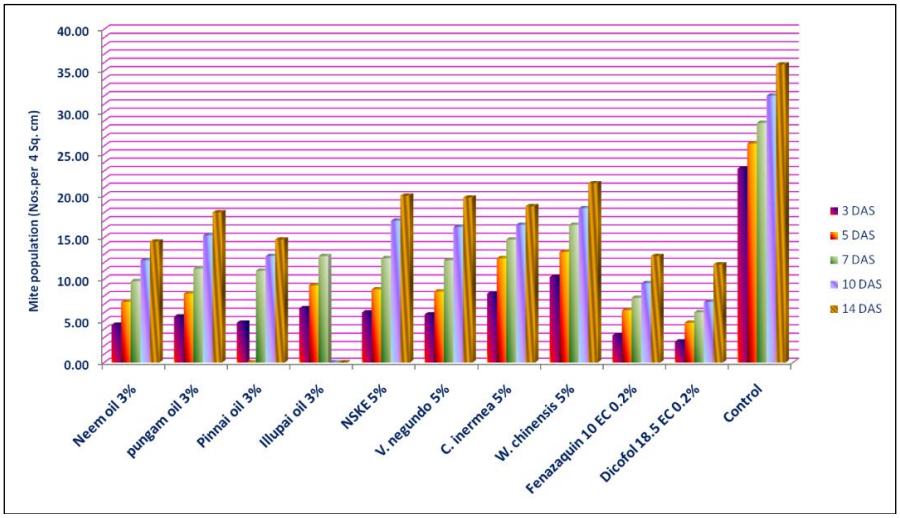

Fig. 1. Population of two spotted spider mite on bhendi plants sprayed with certain botanical extracts, oils and acaricides under pot culture condition. (First spray)

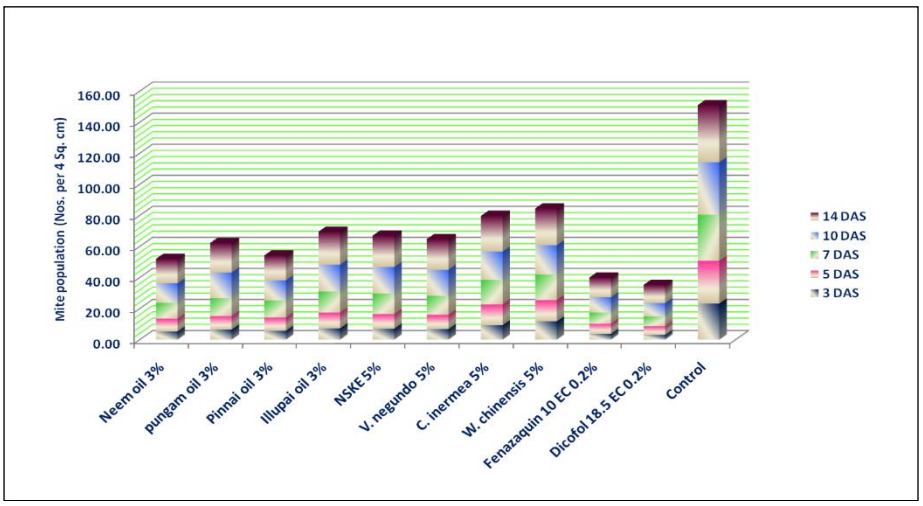

Fig. 2. Population of two spotted spider mite on bhendi plants sprayed with certain botanical extracts, oils and acaricides under pot culture condition. (Second spray)

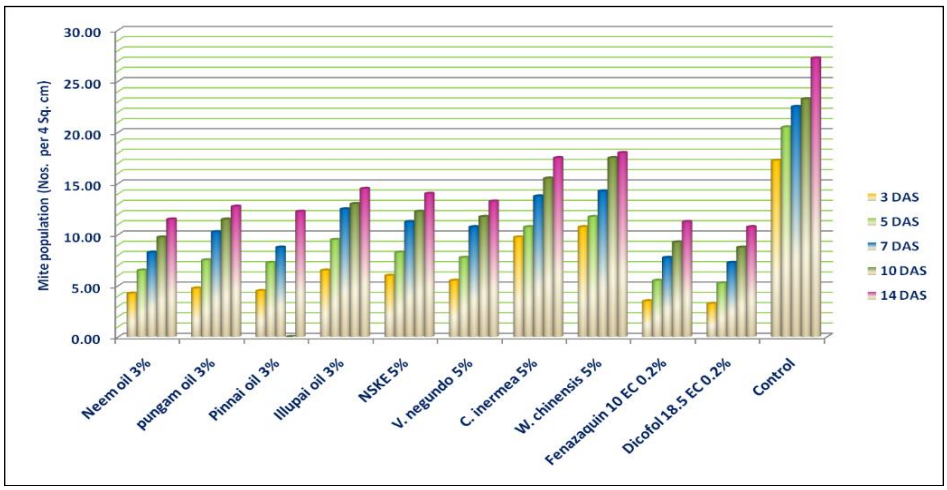

Fig. 3. Population of two spotted spider mite on bhendi plants sprayed with certain botanical extracts, oils and acaricides under field condition. (First spray)

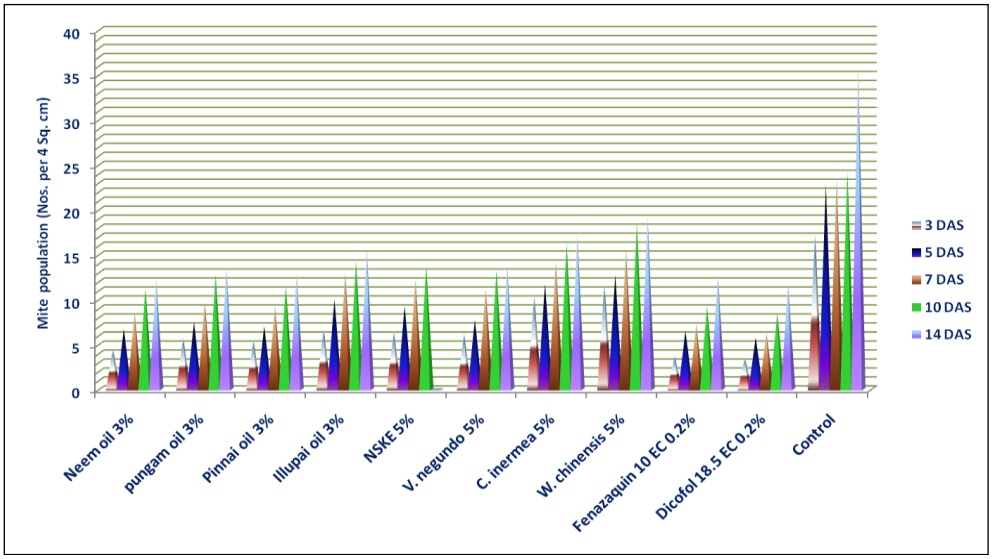

Fig. 4. Population of two spotted spider mite on bhendi plants sprayed with certain botanical extracts, oils and acaricides under field condition. (Second spray)

Certain botanical extracts, oils and acaricides were tested against *T. urticae* Koch. on okra under field condition. Before treatment the mite population per plant application ranged from 14.75 and 18.00 (Table 3). On the third day after first spray, maximum mite population was observed in neem oil 3% sprayed okra plants. Whereas the least mite population was observed in fenazaquin 10 EC 0.2%. A similar trend was observed on the mite population during 5, 7, 10 and 14 days after spraying.

Based on pooled mean data after 14 day of first spraying, the maximum mite population was observed in neem oil 3% sprayed plants. Whereas the least mite population was observed in fenazaquin 10 EC 0.2% sprayed plants (Fig. 3).

Similar trend was also observed after second spraying on okra against two spotted spider mite under field experiment. This in turn implies that acaricides recorded maximum mite mortality followed by oils and botanicals. The mite population on 14 days after first spray on bhendi was considerably reduced. The present results obtained was in accordance with results of Umamaheshwari et al*.,* (1999); Siva kumar and Hariprasad (1999); Ramaraju (2004); Ambika and Chinniah (2007); Jasmine *et al.,* (2008); Pavela (2009); Vinoth kumar et al., (2010) and Najafabadi *et al*., (2012). Among the acaricides tested, fenazaquin 10 EC recorded a maximum yield of 22.62 (kgs/10 pickings) of bhendi fruits per plant which was followed by dicofol 18.5 EC 21.91 and neem oil 3% 21.08 (kgs/10 pickings) of fruit per plant. Fenazaquin 10 EC and dicofol 18.5 EC significantly reduced the mite population on bhendi after two rounds of spraying with increased yield (Table 4).

The present results are in agreement with those documented by Sathyaseelan and Baskaran (2009) who reported that the maximum mite mortality was recorded in *Andrographis* leaf extract followed by NSKE, *V. negundo* leaf extract showed moderate effect, whereas the least mortality was recorded in *Ocimum* leaf extract against two spotted spider mite under field condition. This was similar to findings of Afify *et al*., (2012) who reported that the acaricidal activity of various botanicals, plant extracts and essential oils were highly effective against various sucking pests including two spider mite.

4. CONCLUSION

Efficacy of certain botanical extracts, oils and acaricide against two spotted spider mite, *Tetranychus urticae* on bhendi under potculture and field conditions almost throughout the observation period. The efficacy of fenazaquin 10 EC 0.2%, dicofol 18.5 EC 0.2% and 3% neem oil have proved to be superior in reducing the mite population on bhendi under pot culture condition. The maximum yield was recorded in fenazaquin 10 EC followed by dicofol 18.5 EC and 3% neem oil *i.e* 242.40, 232.16 and 225.35 gram per plant respectively. Among the treatments, fenazaquin 10 EC 0.2%, dicofol 18.5 EC 0.2% and 3% neem oil have proved to be superior in reducing the

mite population on bhendi under fieid condition. The maximum yield was recorded with fenazaquin 10 EC followed by dicofol 18.5 EC and 3% neem oil *i.e.* 22.62, 21.91 and 21.08 (kg/ 10 pickings) respectively. Among the newer acaricide molecules, fenazaquin 10 EC (0.2%) was found to be highly effective in the management of two spotted spider mite population. All the treatments irrespective of the doses tested did not inflict any phytotoxicity symptoms like, leaf injury, wilting, vein clearing, necrosis, epinasty and hyponasty on bhendi.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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