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Evaluation of acaricides and TNAU neem oils against spider mite, *Tetranychus urticae* (Koch) on bhendi and brinjal

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Abstract : Field and pot culture experiments were conducted to evaluate the bioefficacy of acaricides and TNAU neem oils against *Tetranychus urticae* (Koch) on bhendi and brinjal. Dicofol, monocrotophos, phosalone, wettable sulphur, Tamil Nadu Agricultural University Neem oil (TNAU NO 60 EC), Neem oil + Pungam oil (NOPO 60EC) and Neem seed kernel extract (NSKE) were used for the study. Dicofol 0.05% proved to be the most effective causing 70.56 to 91.85 per cent reduction of mites in bhendi and 66.99 to 99.20 per cent reduction in brinjal both under field and pot culture conditions. The insecticides *viz.* wettable sulphur, phosalone and monocrotophos were next in order. The descending order of effectiveness was found to be NOPO, NSKE and TNAU NO.

Key words: *Bhendi, brinjal, red spider mites, Tetranychus urticae.*

Introduction

The carmine spider mite or two spotted spider mite, *Tetranychus urticae* (Koch) (Acari: Tetranychidae) is a cosmopolitan species found on a wide range of hosts including vegetable crops, greenhouse plants, fruit trees, groundnut (Nandagopal and Gedia, 1995) and ornamental plants. Bhendi and brinjal are the worst sufferers due to the attack of this mite (Singh and Mukherjee, 1991). This mite is being referred wrongly as *T. cinnabarinus* (Boisdudal) in literature by several authors in India for the past ten years. Meyer (1987) concluded that *T. cinnabarinus, T. cucurbitacearum, T. ricinus, T. telarius* and *T. arabicus,* all are synonymous with *T. urticae.* The mites penetrate the leaf tissues with the help of cheliceral - stylets and the liberated plant fluid is then sucked in. The removal of chlorophyll and plant pigments results in characteristic blotching of the leaves. In heavy infestations, the mites produce web all over the plant surface. The mite develop rapidly on its host plants causing distress and quick death of the plants (Banerjee, 1989). A total yield loss of 26.5 per cent was recorded in bhendi crop due to *T. urticae* in Tamil Nadu during 1996 (Anon., 1998). In brinjal this mite was estimated to cause a yield reduction of 13.64 to 31.09 per cent at Bangalore and Varanasi (Anon., 1996).

The present study was carried out to evaluate the efficacy of some commonly used acaricides and botanicals against this mite in order to develop an ecofriendly management practices.

Materials and Methods

Two pot culture experiments, one each in bhendi and brinjal were conducted in the glasshouse of Tamil Nadu Agricultural University, Coimbatore. The experiments were conducted in a completely randomized block design with eight treatments *viz.* dicofol 18.5 EC 0.05%, monocrotophos 36 SL 0.05%, phosalone 35 EC 0.07%, wettable sulphur 80 WP 0.25%, Neem oil + pungam oil 60 EC (NOPO) 3%, Tamil Nadu Agricultural University neem oil 60 EC - C (TNAU NO) 3%, neem seed kernel extract (NSKE) 5% and untreated check. Each treatment was replicated thrice. Variety Pusa Sawani of bhendi and a local variety of brinjal were used for the study. One round of foliar spray was given and the population was recorded. For the assessment of mite population, three leaves representing top, middle and bottom regions

Table 1. Bioefficacy of insecticides and botanicals against *Tetranychus urticae* on bhendi under field condition.

Treatment	Conc.	Per cent reduction of mites									
		I Spray					II Spray				
		1DAT	3DAT	7DAT	15DAT	Mean	1DAT	3DAT	7DAT	15DAT	Mean
Dicofol 18.5 EC	0.05	91.85^{a}	89.92^{a}	75.83^{a}	70.56^{a}	82.02	91.01^{a}	89.74^{a}	86.35^{a}	76.18^{a}	85.82
Monocrotophos 36 SL	0.05	65.62^{c}	61.85^{c}	51.16^{c}	45.79^{b}	56.11	71.16^{b}	71.53^{b}	62.91^{bc}	57.05^{bc}	65.79
Phosalone 35 EC	0.07	69.48^{c}	74.95^{b}	65.00^{b}	64.61^{a}	68.51	70.64^{bc}	66.47^{bc}	54.36^{bc}	54.50^{bc}	61.38
Wettable sulphur 80WP	0.25	82.57^{b}	80.97^{ab}	75.18^{a}	69.76^{a}	77.12	61.25^{bcd}	62.67^{bc}	68.44^{b}	57.49^{bc}	62.46
NOPO 60 EC	3.00	57.14^{d}	54.04^{cd}	48.11^{c}	39.61^{bc}	49.73	48.81^{d}	60.09^{bc}	55.14^{bc}	55.08^{bc}	54.78
TNAU NO 60 EC(C)	3.00	45.19^{e}	39.39^{e}	35.61^{d}	37.44^{c}	39.41	51.67^{d}	57.10^{bc}	59.59^{bc}	51.56^{c}	54.23
NSKE	5.00	51.73^{de}	45.59^{de}	37.89^{d}	36.71^{c}	42.98	54.78^{cd}	51.55^{c}	47.27^{c}	48.28^{c}	50.55

DAT - Days after treatment

Means followed by common letter(s) are not significantly different by (P=0.05) DMRT

were selected from each plant and the number of nymph and adult mites per sq.cm area was counted.

Two field experiments were conducted one each on bhendi and brinjal at Thennamanallur village of Coimbatore district. The Mahyco hybrid 10 variety was used for bhendi and a local variety was used for brinjal. The experiments were laid out in a RBD with eight treatments and three replications in plots of size 4x5 m^2. Two rounds of spray were given and the population was recorded from five randomly selected plants in each plot. One pre-treatment and four post treatment counts on 1,3,7 and 15 days after spray (DAS) were made. For the assessment of mite population, three leaves representing top, middle and bottom regions were selected from each plant and the number of nymph and adult mites per sq.cm area was counted. Percentage reduction of mites after treatment was calculated using Henderson and Tilton (1955) formula and the data were statistically analysed to draw conclusions.

Results and Discussion

The results of the pot culture experiment in bhendi revealed that dicofol 0.05% was the most effective chemical recording 70.56 to 91.85 per cent reduction of mites after the first round of spray and 76.18 to 91.01 per cent reduction after second round of spray upto 15 DAS. The descending order of effectiveness of insecticides for mite control was wettable sulphur 0.25% (62.46 to 77.12%), phosalone 0.07% (61.38 to 68.51%), monocrotophos 0.05% (56.11 to 65.79%), NOPO 60 EC 3% (49.73 to 54.78%), NSKE 5% (42.98 to 50.55%) and TNAU NO 60 EC [C] 3% (39.41 to 54.23%) (Table 1). Similar results were obtained in the field experiment and dicofol recorded the highest per cent reduction (85.14 to 90.98) upto 15 DAS (Table 2).

Table 2. Bioefficacy of insecticides and botanicals against *Tetranychus urticae* on bhendi (Pot culture)

Treatment	Conc. (%)	Per cent reduction of mites				
		1DAT	3DAT	7DAT	15DAT	Mean
Dicofol 18.5 EC	0.05	90.98^{a}	88.58^{a}	86.88^{a}	85.14^{a}	87.89
Monocrotophos 36 SL	0.05	80.19^{bc}	75.55^{bc}	71.96^{b}	70.57^{b}	74.57
Phosalone 35 EC	0.07	79.10^{bc}	74.41^{bc}	71.01^{b}	63.30^{bc}	71.96
Wettable sulphur 80WP	0.25	86.81^{ab}	83.54^{ab}	81.03^{a}	72.25^{b}	80.91
NOPO 60 EC	3.00	70.30^{cd}	67.93^{cd}	69.88^{b}	62.45^{bc}	67.64
TNAU NO 60 EC(C)	3.00	59.03^{de}	63.52^{cd}	61.74^{c}	53.04^{cd}	59.33
NSKE	5.00	56.29^{e}	56.02^{d}	51.52^{d}	47.89^{d}	52.93

DAT - Days after treatment

Means followed by common letter(s) are not significantly different by (P=0.05) DMRT

In the pot culture experiment with brinjal, dicofol 0.05% effected 85.67, 85.82, 78.51 and 66.99 per cent reduction of mite population at 1,3,7 and 15 DAS respectively after first spray and 85.35, 81.94, 84.45 and 81.32 per cent reduction respectively after the second spray. The other insecticides *viz.* monocrotophos 0.05%, phosalone 0.07%, wettable sulphur 0.25%, NOPO 3%, TNAU NO 3% and NSKE 5% recorded 55.41 to 74.65, 67.38 to 76.19, 47.99 to 77.32, 44.89 to 51.64, 36.76 to 59.46 and 42.95 to 59.95 per cent reduction of mite population respectively (Table 3) after two rounds of spraying.

The results of the field experiment also indicated that dicofol 0.05% was found to be highly effective resulting 81.40 to 99.20 per cent reduction of mites after spraying upto 15 DAT. Among the botanicals TNAU NOPO 60 EC 3 per cent effected 60.30, 61.40, 57.20 and 55.20 per cent reduction of mite population 1, 3, 7 and 15 DAT respectively (Table 4). The other ecofriendly agents *viz.* NOPO and NSKE were next in order.

In the past, these acaricides were tested against various species of mites and were reported to control them effectively. Dicofol was reported to be effective against *T. urticae* in brinjal by Patel *et al.* (1989) and in other crops by Rai and Singh (1996). Among the ecofriendly botanicals, neem oil +' pungam oil mixture followed by NSKE was found to be promising. The acaricidal property of neem has already been reported by many authors (Pande *et al.* 1991; Yathiraj and Jagadish, 1999).

Eventhough the effectiveness of botanicals is not superior to chemicals, they are moderate in their efficacy in reducing the mite population owing to their anti-feedant properties. Considering their ecofriendly and non-toxic nature, these botanicals may be recommended for the suppression of mites in perishables in alteration with synthetic chemicals.

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Table 3. Bioefficacy of insecticides and botanicals against *Tetranychus urticae* on brinjal under field condition.

Treatment	Conc.	Per cent reduction of mites									
		I Spray					II Spray				
		1DAT	3DAT	7DAT	15DAT	Mean	1DAT	3DAT	7DAT	15DAT	Mean
Dicofol 18.5 EC	0.05	85.67^{a}	85.82^{a}	78.51^{a}	66.99^{a}	79.25	85.35^{a}	81.94^{a}	84.45^{a}	81.32^{a}	83.27
Monocrotophos 36 SL	0.05	74.65^{b}	70.60^{b}	63.42^{cd}	55.41^{a}	66.02	69.72^{b}	67.24^{b}	69.27^{bc}	59.09^{b}	66.33
Phosalone 35 EC	0.07	72.32^{b}	73.87^{b}	69.94^{bc}	67.38^{a}	70.88	75.71^{b}	70.39^{b}	76.19^{ab}	74.37^{a}	74.17
Wettable sulphur 80WP	0.25	53.38^{c}	48.81^{c}	47.99^{d}	48.32^{a}	49.63	52.58^{c}	62.0 1^{bc}	77.32^{ab}	76.55^{a}	67.12
NOPO 60 EC	3.00	49.52^{c}	51.30^{c}	49.70^{cd}	45.84^{a}	49.09	-51.64^{c}	44.89^{e}	49.88^{d}	49.11^{c}	48.8
TNAU NO 60 EC(C)	3.00	36.76^{d}	48.29^{c}	52.21^{cd}	45.89^{a}	45.78	56.57^{c}	56.36^{cd}	59.43^{cd}	58.41^{b}	57.70
NSKE	5.00	43.75^{cd}	49.97^{c}	42.95^{d}	43.50^{a}	45.04	48.19^{c}	46.74^{de}	59.95^{cd}	50.00^{c}	51.22

DAT - Days after treatment

Means followed by common letter(s) are not significantly different by (P=0.05) DMRT

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Table 4. Bioefficacy of insecticides and botanicals against *Tetranychus urticae* on brinjal (Pot culture)

Treatment	Conc. (%)	Per cent reduction of mites				
		1DAT	3DAT	7DAT	15DAT	Mean
Dicofol 18.5 EC	0.05	99.20^a	98.45^a	87.20^a	81.40^a	91.56
Monocrotophos 36 SL	0.05	90.40^b	87.25^a	73.14^b	73.54^b	80.98
Phosalone 35 EC	0.07	95.20^b	90.70^a	83.56^a	81.56^a	87.75
Wettable sulphur 80WP	0.25	92.65^b	95.60^a	89.72^a	80.72^a	89.67
NOPO 60 EC	3.00	60.30^d	61.40^b	57.20^c	55.20^b	59.02
TNAU NO 60 EC(C)	3.00	51.82^e	50.72^c	54.30^c	54.20^b	52.81
NSKE	5.00	69.00^c	66.40^b	45.00^d	45.00^c	56.35

DAT - Days after treatment

Means followed by common letter(s) are not significantly different by (P=0.05) DMRT

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