

Efficacy of botanicals on the management of coconut mite *Aceria guerreronis* (Keifer) (Acaridae: Eriophyidae)

K. Balaji and Y. Hariprasad

ABSTRACT

Two field trials were undertaken at the Kadavasal village of Chidambaram district during September-December, 2000 and the second trial from January-April 2000 to evaluate the efficacy of botanicals against coconut mite *Aceria guerreronis*. The treatments were as follows: Phytopalm 5%, Phytopalm 3%, Neem azal 1%, Fortune Aza 1.5%, Neem Seed Kernel Extract 5%, Neem oil 3%, Nochi leaf extract 3%, Calotropis leaf extract 5% and Monocrotophos 0.04%. The experiment was laid out in a randomized block design with nine treatments replicated three times. Each replication consisted of one palm. Among the botanicals tested, the highest per cent reduction of mite population was recorded in Phytopalm 5% (62.52%), Phytopalm 3% (57.73%), Neem Seed Kernel Extract 5%, (33.50%), Neem oil 3% (31.31%), Neem azal 1% (29.30%) and Fortune Aza 1.5% (26.66%), whereas the least per cent reduction of mite population was noticed in Calotropis leaf extract (17.46%).

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INTRODUCTION

Coconut (*Cocos nucifera* Linn.) is the most important plantation crop in the world. More than 10 million people in India are dependent on coconut in various ways. The crop contributes more than 8900 crores to the country's Gross Domestic Product apart from export earning of Rs 695 crores (Nair *et al.*, 2011). In India, It is grown in 939.90 million hectares with a production of 5840 million nuts and a productivity of 8165 nuts per hectares. Among the various non insect pests that have been reported on coconut palm, eriophyid mite *Aceria guerreronis* Keifer (Acari: Eriophyidae) is serious in Southern India. As nuts grow, warts and longitudinal fissures will develop resulting in severe loss (Kanniyan *et al.*, 2000). The control measures currently employed, including foliar spraying and root feeding of chemical pesticides have proved to be partially successful. Using synthetic pesticides has been beset with many

problems causing environmental pollution and health hazards. Alternative control measures involving the use of ecofriendly management tools like botanicals and neem based biopesticides within the ambience of integrated pest management principles have become imperative.

MATERIALS AND METHODS

The present investigation was carried out in two consecutive seasons during September - December 2000 and January-April 2001 at Kadavasal Village, Chidambaram, Tamil Nadu with a 15 year old Tall X Dwarf variety planted with a spacing of 7 X 7 m. The treatments Viz., Phytopalm 5%, Phytopalm 3%, (phytopalm contain the extracts of Custard apple, *Annona squamosa*, Purple tephrosia, *Tephrosia purpurea*, Kharanja, *Pongamia glabra*, Crown plant, *Calatropis gigantea*, Neem, *Azadirachta indica*, Garlic, *Allivum sativum*, Indian privet,

Table 1. Percent reduction of mite population *A. guerreronis* in various treatments during Trial I

Treatments	* Percent reduction of mite population over control								
	Spray I			Spray II			Spray III		
	1DAS	4DAS	8DAS	1DAS	4DAS	8DAS	1DAS	4DAS	8DAS
Phytopalm 3%	10.38d	28.25c	32.58c	51.42c	55.52c	61.76c	52.94b	58.06c	53.93c
Phytopalm 5%	16.96b	36.59b	36.96b	59.04b	57.12b	75.48b	61.39a	60.59b	60.68b
Neem azal 1%	9.59cd	14.84e	24.10d	28.56e	42.67d	34.95g	22.78e	26.52f	36.06d
Fortune Aza 1.5%	9.96c	13.02e	24.58e	33.32d	36.59e	37.90f	25.37c	29.75e	32.10e
Neem seed kernel extract 5%	10.32c	18.47d	25.77e	23.81f	29.65g	41.17d	23.89d	26.52f	27.80g
Neem oil 3%	12.53b	18.83d	27.42d	24.76f	32.49f	39.21e	26.08c	30.00d	30.06f
Nochi leaf extract 3%	9.21d	13.08e	21.56f	14.58h	17.65i	30.25h	11.75g	18.99h	19.90i
Calotropis leaf extract 5%	11.43d	13.39e	22.38f	19.68g	24.28h	23.19i	15.06f	20.07g	21.03h
Monocrotophos 0.04%	32.85a	43.89a	49.94a	81.90a	84.85a	86.92a	61.77a	68.46a	73.81a
Control	-	-	-	-	-	-	-	-	-
S.D	0.34	0.53	0.89	0.48	0.63	0.25	0.29	0.27	0.27
C.D (0.05%)	0.68	1.08	1.80	0.96	1.27	0.51	0.59	0.54	0.56

Mean values with different alphabets differ significantly; DAS-Days after Spray

Vitex negundo and Camphor), Neem azal 1%, Fortune Aza 1.5%, Neem Seed Kernel Extract 5%, Neem oil 3%, Nochi leaf extract 3%, Calotropis leaf extract 5% and Monocrotophos 0.04% were evaluated against *A. guerreronis*. Monocrotophos 0.04% was used as standard check. Experiment was conducted in a randomized block design with three replicates consisting of single palm each. The respective treatments were applied on third bunch from top as it contains highest population. (Ranjith *et al.*, 2001). Experiment was conducted in a randomized block design with three replicates consisting of single palm each. The respective treatments were applied on third bunch from top as it contains highest population. Observations were made on 1, 4 and 8 days after spray. The nuts were collected from the

treated bunches and population of mites were determined by “cello tape embedding technique” (Girija *et al.*, 2001). The perianth was removed from the button mechanically. A transparent cello tape of one inch width was taken and 8 mm² area was marked on the cello tape by using permanent marker pen and embedded on the nut surface. Population of mites was counted immediately after removing the perianth without disturbing the colony by keeping the slide under a stereo microscope at 10 X magnification. Counting was done using the hand tally counter. The mites that got adhered in the cello tape were counted to arrive at the total population of mites in 8 mm² square area. For comparison of all the treatments, Duncan’s Multiple Range Test was adopted (Gomez and Gomez, 1984).

Table 2. Mean percentage reduction of mite population *A. guerreronis* (Trial I)

Treatments	Mean per cent reduction of mite population over control		
	Days After Spray		
	1DAS	4DAS	8DAS
Phytopalm 5%	38.24b	51.43b	63.70b
Phytopalm 3%	45.92b	47.27b	62.60b
Neem azal 1%	20.31c	28.01c	32.77d
Fortune Aza 1.5%	22.88c	26.45c	32.70d
Neem seed kernel extract 5%	19.34c	24.88d	32.31d
Neem oil 3%	21.12c	27.10c	33.89d
Nochi leaf extract 3%	11.84d	16.57e	22.85e
Calotropis leaf extract 5%	15.39d	19.24e	20.99e
Monocrotophos 0.04%	58.71a	65.73a	77.92a
Control	-	-	-
S.D	3.68	3.24	1.67
C.D (0.05%)	7.36	6.37	3.37

Mean values with different alphabets differ significantly; DAS-Days after Spray

RESULTS AND DISCUSSIONS

Field Trial I

Mean per cent reduction *A. guerreronis* The data presented in Table 2 showed that one day after spray, the highest mean per cent reduction of mite population was noticed in monocrotophos 0.04%. One day after spray phytopalm 5% and phytopalm 3% which were on a par with each other. On fourth day after

spray, monocrotophos 0.04% registered 65.73 per cent reduction followed by phytopalm 5% and phytopalm 3%. Treatment with neem azal 1%, neem oil 3%, fortune aza1.5% and neem seed kernel extract 5% recorded 28.01, 27.10, 26.45 and 24.88 per cent respectively. On eighth day after spray, the highest per cent of reduction was observed in monocrotophos 0.04%. The next highest per cent reduction was registered in

phytopalm 5% and phytopalm 3% followed by neem azal 1%, neem oil 3%, fortune azal 1.5% and neem seed kernel extract 5% respectively. The present study is a spray of neem oil @25 and 30 mL/litre of water to control *A. guerreronis*. These findings are further supported by the observation made by Ramaraju *et al.* (1999). They observed that the crown spraying of TNAU neem oil 60% EC recorded the highest per cent mortality of 58.57 at seven days after treatment.

Field Trial II

Mean per cent reduction *A. guerreronis*

The results presented in Table 4 indicated that one day after spray maximum per cent reduction was observed with monocrotophos 0.04%. Among the botanicals, phytopalm 5% and phytopalm 3% recorded 44.98 and 38.73 per cent reduction in mite population. All the remaining treatments were significantly superior to untreated check Four days after spray; monocrotophos 0.04% recorded 60.76 per cent followed by treatment *viz.*, neem oil 3%, neem seed kernel extract 5% fortune azal 1.5% recording 25.02, 24.94 and 23.15 per cent reduction respectively.

Nair *et al.* (1999) noticed that neem formulations like neem azal (T/S 1% or 5%) 6 mL/litre, neem azal+ wettable sulphur 2 mL+3g/litre recorded 75.10 reduction in infestation. Muthiah and Baskaran (2000) reported that neem oil 2% + garlic extract 2% have effected 63 per cent population reduction. It is also observed that spraying dicofol 6mL/litre and two per cent neem oil + garlic mixture at monthly intervals gave a reasonable control of the mite. The present findings are in agreement with the earlier reports of Subharan *et al.* (2001) who observed that spraying of neem azal (T/S1% or 5%) 6 mL/litre of water recorded 79.68 reduction in infestation, spraying neem azal+ wettable sulphur 2 mL +3g/litre of water recorded 75.06 per cent reduction in infestation and also spraying of neem oil 20 mL +garlic extract 20g +soap 50g /litre of water recorded 68.47 reduction in infestation. On eighth day after spray, it was found that among the botanicals tested phytopalm 5% and phytopalm 3% proved better than other

treatments in the reduction of mite population. The other botanicals in decreasing order of their efficacy were neem seed kernel extract 5%, neem oil 3% and neem azal 1%. The present results are in line with the reports of Nair *et al.*, (2011) that the plant protection schedule involves spraying neem based pesticides three times a year during April-May, September-October, September-January to regulate pest population build up.

Minnie Mathew (2013) recommended spraying of neem oil - garlic soap emulsion 2 per cent (20 mL neem oil +20gm garlic emulsion + 5gm soap in 1 litre water) which is in accordance with the present study. Shivarama Reddy and Naik (2000) have observed that spraying of bunches at the crown with a mixture of neem oil 20mL mixed with garlic extract 20g and soap 50g at monthly interval effectively controlled the mite as observed in our study.

Chandrika Mohan and Josephraj Kumar (2013) reported that spraying 2-6 month old nuts with 2% neem oil-garlic-soap emulsion /neem formulation containing azadirachtin 10000 ppm (0.04%) thrice a year during January, April and September effectively manage the pest.

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Table 3. Percent reduction of mite population *A. guerreronis* in various treatments in Trial II.

Treatments	* Percent reduction of mite population over control								
	Spray I			Spray II			Spray III		
	1DAS	4DAS	8DAS	1DAS	4DAS	8DAS	1DAS	4DAS	8DAS
Phytopalm 3%	16.60c	25.42c	49.88b	51.95c	58.73c	65.72c	50.69b	55.07c	57.55
Phytopalm 5%	18.30b	35.47b	51.49b	58.49b	67.94b	75.87b	58.17a	59.42b	60.22b
Neem azal 1%	10.55c	17.19f	27.58d	28.84d	35.23d	34.20f	23.42c	24.64d	26.13d
Fortune Aza 1.5%	12.54d	15.76f	25.05e	25.48e	30.15d	31.47g	22.63de	23.55e	23.48e
Neem seed kernel extract 5%	11.18d	20.42e	31.72c	19.27g	35.22d	47.22d	17.12f	19.20g	21.58f
Neem oil 3%	11.22d	22.65d	32.29c	21.22f	31.42e	37.78e	19.57d	21.01f	23.86e
Nochi leaf extract 3%	10.44d	12.54g	20.33f	13.72h	18.71f	22.78h	18.17e	18.11h	20.45g
Calotropis leaf extract 5%	10.51b	16.11f	18.26g	17.74g	20.00f	19.84i	16.07d	22.67f	14.70h
Monocrotophos 0.04%	20.66a	47.30a	70.00a	66.33a	72.38a	80.44a	58.70a	62.60a	65.90a
Control	-	-	-	-	-	-	-	-	-
S.D	0.91	0.5	0.44	0.62	0.68	0.64	0.41	0.12	0.30
C.D (0.05%)	1.83	1.32	1.27	1.24	1.37	1.30	0.83	0.25	0.61

Mean values with different alphabets differ significantly; DAS-Days after Spray

Table 4. Mean percent reduction of mite population *A. guerreronis* in Trial II

Treatments	Mean Percent reduction of mite population over control		
	1 DAS	4DAS	8DAS
Phytopalm 5%	44.98a	54.27b	62.52b
Phytopalm 3%	38.73a	46.50b	57.73b
Neem azal 1%	20.92b	25.68c	29.30d
Fortune Aza 1.5%	20.21b	23.15c	26.66d
Neem seed kernel extract 5%	15.85b	24.94c	33.50c
Neem oil 3%	17.33b	25.02c	31.31c
Nochi leaf extract 3%	14.12b	16.45c	21.18e
Calotropis leaf extract 5%	16.80b	19.59c	17.46e
Monocrotophos 0.04%	45.56a	60.76a	72.11a
Control	-	-	-
S.D	3.21	3.1	2.39
C.D (0.05%)	9.31	6.42	4.84

Mean values with different alphabets differ significantly, DAS-Days after Spray

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