

Utilization of botanicals in the management of the coconut perianth mite, *Aceria guerreronis* Keifer

B. S. Nandihalli

Department of Agricultural Entomology University of Agricultural Sciences, Dharwad, Karnataka, India.

ABSTRACT

Keywords: Botanicals, management, coconut mite

The experiment on utilization of botanicals in the management of the coconut perianth mite, *Aceria guerreronis* Keifer was conducted at Main Agricultural Research Station, Dharwad, Karnataka during 2003-04 with nine treatments. The results of the present study indicated that among different botanicals, NSKE 5 percent was found significantly superior in reducing the mite population with higher healthy nuts (81 nuts 4 bunches), least percent of damaged nut (65 per cent) and highest benefit which was on par with wettable sulphur. The next best treatment was neem oil 2 percent.

Introduction

The coconut palm is infested by a large number of insects and mites during different stages of its growth and development. Kurian *et al.* (1979) had listed as many as 830 insects and mites on coconut palm. A few among them are responsible for heavy crop losses in coconut. Recently, a coconut perianth mite, *Aceria guerreronis* Kiefer has created havoc in coconut industry. The mite is inhabitant in clusters on the basal portion of the nuts below perianth. As the mites feed, the damage initially appeared as a triangular brownish patch at the base of perianth lobes. As the infestation advance, such brownish triangular patches ultimately lead to warting and longitudinal fissures on the nut. In extreme cases, sap draining from nuts resulted in reduction of nut size and kernel content and poor quality of husk. Presently, number of chemicals have been tested against the mite. But these chemicals are not eco-friendly and have residual effect. There may be chance of development of resistance by the mites against chemicals. Hence, there is need to search for the compounds to control the mite which are eco-friendly. Keeping these points in view, present investigation was carried out to evaluate different botanicals against the mite.

Materials and Methods

The studies on the bio-efficacy of plant products against eriophyid mite were carried out under field condition at Main Agricultural Research Station, Dharwad during 2003-04. The

selected coconut trees were in the age group of 10-15 years reaching 6 to 8 m height. The experiment was laid out in a randomized block design with nine treatments with two palms in each treatment which was replicated thrice. The different plant products used for the experiment are listed in the table 1 along with their dosage.

Neem seed kernel and black pepper were crushed into powder using grinder mixture. The required quantities of neem seed kernel, black pepper and turmeric powder were soaked in water overnight. The solutions were extracted next day using a muslin cloth. The volumes of these aqueous extracts were made to 12 litres each. The rocker sprayer was used for spraying of botanicals. Two litres of spray solution was used on each tree. The treatments were applied three times at three months interval.

Three infested nuts from 4th bunch per treatment were collected and brought to the laboratory to observe the mite population. From each nut three inner surface of the inner perianths and three sliced nut surface areas below the perianth were selected for taking observations. Observations on the mite population were recorded using the stereobinocular microscope in an area of 28.28 mm² on a day before, 7, 14, 21 and 28 days after each treatment. Average values of mite population were worked out. Ten months after first spray, the nuts of 5th through 8th bunches were graded into different categories based on the damage levels. Number of damaged, healthy and total nuts per four bunches were also recorded. The data were subjected to statistical analysis.

Results and Discussion

The data (table 1) indicated that the number of mites a day before spraying was statistically non-significant and mite population ranged from 82.83 to 89.27 mites/28.28 mm² area. At 7th DAS, NSKE and wettable sulphur were significantly superior treatments and recorded 57.09 and 57.20 mites with 34.69 and 34.56 percent reduction of mites, over untreated control, respectively.

Fourteen days after treatment, NSKE and wettable sulphur retained their superiority by recording least number of mites of 40.59 and 42.99 mites with 53.24 and 50.47 percent reduction over control, respectively and were at par with each other. Similar trend was observed at 21 DAT. NSKE 5% recorded 32.44 mites with a reduction of 60.13 percent which was on par with wettable sulphur. The next best treatment was nimbecidine which recorded 43.77 mites with a reduction of 46.1 percent.

Twenty eight days after treatment NSKE emerged as superior treatment by recording 38.16 mites with 51.65 per cent reduction of mites over control which was at par with wettable sulphur (44.27 mites). Black pepper 1 per cent (17.24) and bioneem (16.34) were inferior treatments throughout the experimental period (Table 1).

Wettable sulphur treated palms recorded more number of healthy nuts (36/4 bunches) and maintained superiority among all the treatments. The next best treatment was NSKE 5 percent

(29 nuts/4 bunches). Significantly less number of healthy nuts was observed in black pepper 1 percent (6.00 nuts/4 bunches) while untreated control did not recorded healthy nuts. NSKE treated palms maintained superiority by bearing highest number of total nuts (81 nuts/4 bunches) followed by wettable sulphur (66 nuts/4 bunches). Percent damaged nuts indicated that wettable sulphur treated palms possessed least damage nuts of 41.10 percent. Among botanicals, NSKE was the most effective treatments and recorded 65.00 per cent damaged nuts whereas, untreated palms possessed 100 percent damaged nuts (Table 2).

Average grading of nuts clearly indicated that wettable sulphur (1.81) treated nuts showed least damage category and was at par with NSKE (1.88), nimbecidine (1.94) and turmeric (2.12) treated nuts. Bioneem (2.74) and black pepper 1 percent (2.54) were least effective treatments among the botanicals. Among different botanicals, NSKE recorded highest benefit:cost ratio (12.2) which was followed by wettable sulphur (10.48) and neem oil (7.60).

Superiority of the neem product compared to other botanicals may be due to its azadirachtin content, which exhibited high ovicidal, antifeedent and toxic properties resulting in suppression of mite population. The present findings are in agreement with Balaji and Hariprasad (2003) who reported that NSKE at 5 percent was found effective in managing the mite. Thirumalai *et al.* (2003) observed effective reduction of mite population with application of NSKE (10%).

Table 1

Bio-efficacy of botanicals against coconut perianth mite, *A. guerreronis* (Average of three spraying)

Treatments	Dosage	Number of mites per 28.28 mm ² area								
		1 DBS	7 DAS	% *	14 DAS	% *	21 DAS	% *	28 DAS	%*
1. Neem oil	2%	82.90 ^a	70.33 ^{cd}	19.54	57.68 ^{cd}	33.55	49.53 ^c	39.13	49.79 ^{bc}	36.92
2. Nimbecidine	5 ml/l	86.83 ^a	64.44 ^{bc}	26.28	50.46 ^{bc}	41.82	43.77 ^b	46.21	50.11 ^{bcd}	36.52
3. Neem seed kernel extract	5%	84.78 ^a	57.09 ^a	34.69	40.59 ^a	53.24	32.44 ^a	60.13	38.16 ^a	51.65
4. Turmeric powder	2.5%	85.39 ^a	69.85 ^{cd}	20.09	62.16 ^{de}	28.39	58.29 ^{de}	28.37	57.16 ^{de}	27.59
5. Black pepper powder	2%	82.83 ^a	69.31 ^{cd}	20.71	60.50 ^{cd}	30.30	54.72 ^{cd}	32.75	54.57 ^{cde}	30.87
6. Black pepper	1%	85.00 ^a	73.72 ^d	15.67	69.37 ^e	20.08	64.72 ^{cf}	20.47	65.33 ^{cde}	17.24
7. Bio neem	5 ml/l	84.05 ^a	71.63 ^d	18.37	65.66 ^{de}	24.36	60.88 ^{cf}	25.19	66.01 ^{gh}	16.37
8. Wettable sulphur 80 WP	5 g/l	89.27 ^a	57.20 ^a	34.56	42.99 ^a	50.47	32.12 ^a	60.53	44.27 ^{ab}	3.91
9. Untreated control		84.89 ^a	87.45 ^c	-	86.81 ^f	-	81.38 ^g	-	78.94 ^h	-
CV (%)		5.61	5.55	-	8.44	-	6.16	-	6.54	-

* Reduction over UTC: DAS – Days after spraying; DBS – Days before spraying UTC – Untreated control
Means followed by same alphabet do not differ significantly by DMRT (p = 0.05)

Table 2Bio-efficacy of botanicals on nut damage and grading due to *A. guerreronis*

Treatments	Dosage	Number of nuts/4 bunches			Damaged nuts (%)	Damaged grading	B:C ratio
		Healthy	Damaged	Total Nuts			
1. Neem oil	2%	12.00 ^{de}	53.00 ^e	65	81.63 ^{ef}	2.36 ^{cdef}	7.6
2. Nimbecidine	5 ml/l	14.00 ^d	35.00 ^e	49	69.03 ^{cd}	1.94 ^{ab}	8.30
3. Neem seed kernel extract	5%	29.00 ^b	52.00 ^e	81	65.00 ^{bc}	1.88 ^{ab}	12.20
4. Turmeric	2.5%	19.00 ^c	31.00 ^{abc}	50	65.21 ^{bc}	2.12 ^{abcd}	3.18
5. Black pepper	2%	15.00 ^d	46.00 ^e	61	75.40 ^{cd}	2.18 ^{bcd}	2.05
6. Black pepper	1%	6.00 ^f	41.00 ^d	47	86.82 ^f	2.54 ^{ef}	0.77
7. Bio neem	5 ml/l	10.00 ^e	22.00 ^{bc}	32	82.49 ^{de}	2.74 ^f	0.36
8. Wettable sulphur 80 WP	5 g/l	36.00 ^a	30.00 ^{ab}	66	41.10 ^a	1.81 ^{ab}	10.48
9. Untreated control		00.00 ^g	32.00 ^{bc}	32	100.00 ^g	3.15 ^g	
CV (%)		12.86	6.53		9.03	9.18	

Means followed by same alphabet do not differ significantly by DMRT (P = 0.05)

Dicofol – Rs. 240/l, Monocrotophos – Rs. 300/l, Triazophos – Rs. 740/l,

Methyldemeton – Rs. 420/l and Wettable sulphur – Rs. 98/kg

Labour cost for spraying Rs. 50/day

Healthy – Rs. 5/nut Damaged – Rs. 3/nut (grade <2) Rs. 2/nut (grade >2)

Ramaraju *et al.* (2000) observed that TNAU neem oil 60 EC three percent gave 55.14 percent mite mortality. The present findings are in agreement with Srikanth (2001) who reported that NSKE 4 percent was effective up to 21 days by recording 75.45 percent reduction of mite population.

Literature Cited

- Balaji K Hariparasad Y. 2003 Bio-efficacy of some plant products against coconut mite, *Aceria guerreronis* Keifer (Acari : Eriophyidae). In: *National Symposium Bio-Management of Insect Pests*, on 29th, 30th and 31st, March 2003 at Tamil Nadu Agricultural University, Coimbatore, India, 107pp.
- Kurien C Sathiamma B Pillai GB Ponnammam KN. 1979 Insects and mites associated with the coconut palm (*Cocos nucifera* L.). In : *Nematodes fungi, Insects and Mites Associated with the Coconut Palm, CPCRI Technical Bulletin*, Central Plantation Crops Research Institute, Kasaragod, India, 2 : 93-136.
- Ramaraju K Natarajan K Sundarababu PC Palanisamy S. 2000 Studies on coconut eriophyid mite, *Aceria guerreronis* K. in Tamil Nadu, India pp. 8-9. In: *International Workshop on Coconut Eriophyid Mite* held at CRI, Srilanka, Jan 5-7, 2000.
- Srikanth PN. 2001 Studies on dispersal, population dynamics and management of coconut mite, *Aceria guerreronis* Keifer (Acari : Eriophyidae). *M. Sc. (Agri.) Thesis*, University of Agricultural Sciences, Bangalore, India.
- Thirumalai Thevan PS Srinivasan TR Kuamar N Manoharan T Muthukrishnan N. 2003 Bio-efficacy of botanicals against coconut eriophyid mite, *Aceria guerreronis* Keifer. In: *National Symposium on Bio-Management of Insect Pests*, on 29th, 30th and 31st, March 2003 at Tamil Nadu Agricultural University, Coimbatore, India, 107pp.