

A CASE STUDY

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Evaluation of biopesticides against coconut perianth mite *A. guerreronis* Keifer under laboratory conditions

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ABSTRACT

A laboratory experiment was conducted at Department of Agricultural Entomology, Annamalai University, Chidambaram to know the efficacy of some pesticides and biopesticides against *A. guerreronis*. The treatments used were Phytopalm 1.5g, Phytopalm 1g, Neem azal 1 per cent, Fortune aza 1.5 per cent, Neem Seed Kernel Extract 5 per cent, Neem oil 3 per cent, Nochi leaf extract 3 per cent, Calotropis leaf extract 5 per cent. For comparing the efficacy of selected botanicals and monocrotophos 0.04 per cent was used as treated check in Randomized Block Design with five replications.

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INTRODUCTION

Coconut is grown in more than 86 countries worldwide, with a total production of 54 billion nuts per annum. India occupies the premier position in the world with an annual production of 13 billion nuts, overtaking Indonesia and the Philippines, the other two prominent coconut-growing countries. India is third largest coconut producing country. The crop covers an area of 1.9 million hectares with an estimated production of 12.8 billion nuts per annum, which account for about 22.36 per cent of the world production. The eriophyid mite, *Aceria guerreronis* Keifer belonging to family Eriophyidae was unknown in Indian subcontinent till 1984, when it was first recorded from Srivilliputhur area of Tamil Nadu. In India, the mite attained a major pest status in the three

peninsular states of India viz., Kerala, Karnataka and Tamil Nadu and it is spreading towards northern States (Sathiamma *et al.*, 1998). Although nine species of eriophyid mites have been reported to attack coconut leaves and nuts, feeding on tender nuts has been found to be cause heavy damage, resulting in the loss of production of nuts. The estimated average loss of copra yield was found to be 10-15 per cent in Tamil Nadu and 11-8 per cent in Benin, 16 per cent in Ivory Coast, 30 per cent in Mexico and 11-28 per cent in St. Lucia.

MATERIAL AND METHODS

Plant products selected and prepared :

Phytopalm, a herbal product which was used in liquid as well as in dust form were supplied by Hi-Tech

Coconut Corporation, Nagercoil. The remaining selective botanicals neem azal (1000ppm), (P.J Margo Private Limited), fortune aza (3000ppm) (Fortune Biotech Limited), neem seed, neem oil and monocrotophos 36 per cent WSC were obtained from the market. nochi leaf extract (3%), calotropis leaf extract (5%) and neem seed kernel extract (5%) were prepared in the laboratory.

Preparation of plant extract :

Phytopalm, an herbal product from Hi tech coconut corporation, Nagercoil was used as well as in dust forms. Both liquid and dust forms contain extracts and grounded forms of the following Custard apple, *Annona squamosa*, Purple tephrosia, *Tephrosia purpurea*, Kharanja, *Pongamia glabra*, Crown plant, *Calatropis gigantea*, Neem, *Azadirachta indica*, Garlic, *Allivum sativum*, Indian privet, *Vitex negundo* and Camphor), from this 30ml and 50ml was mixed with one litre of water to get 3 per cent and 5 per cent, respectively.

Neem seed kernel extract :

The outer rind or seed coat was mechanically removes and the kernels were shade dried and ground into paste. About 50 g of paste was added to one litre of water. This was kept undisturbed overnight and was filtered next day morning then 10 ml of teepal was added to it and sprayed.

Neem oil :

Neem oil was obtained from the fertilizer shop, about 30ml of neem oil was mixed with one litre of water to get three per cent concentration. Ten ml of teepal was added to it and sprayed.

Nochi and calotropis leaf extract :

Three and five kilograms of fresh nochi and Calotropis leaves were collected and cut into small pieces and thoroughly ground into paste. About thirty and fifty grams of paste was added to one litre of water to get three and five litre of concentration, respectively. This suspension was kept undisturbed over night. Then next day morning, suspension was filtered through muslin cloth. Teepol was added to it and sprayed.

Laboratory bioassay :

The bioassay was done in poison food technique. One month old nuts were taken from un infested palms

and meristematic zone of tender coconut was cut into small pieces (1cm.sq), dipped in 2ml of respective botanicals and insecticides solutions separately, air dried for 10 minutes and placed on wet cotton swab. Observations on mortality were recorded at 6.12.18 and 24 hours after treatment and per cent mortality was worked out (Dey *et al.*, 2001).

RESULTS AND DISCUSSION

The findings of the present study as well as relevant discussion have been presented under the following heads:

Bioassay II :

The results obtained from bioassay studies (Table 1) indicated that monocrotophos 0.04 per cent ranked first after 24 hours of treatment with per cent mortality. This was followed by the botanicals like phytopalm 1.5 and phytopalm 1g both recording 86.66 and 80.00 per cent mortality, respectively. Among the botanicals, Calotropis leaf extract 5 per cent and Nochi leaf extract 3 per cent recorded low mortality rate of 60.00 per cent and 52.33 per cent, respectively.

Bioassay II :

The results of the laboratory studies on the efficacy of various treatments against *A.guerreronis* (Table 2) showed that monocrotophos 0.04 per cent was found significantly superior to all other treatments with 100 per cent mortality after 24 hours treatment. Neem oil 3 per cent, phytopalm 1.5g, phytopalm 1.5g neem seed kernel extract 5 per cent and nochi leaf extract 3 per cent were on par with each other.

The per cent mortality decreased in these above treatments to 80.00, 70.00, 63.33 and 56.66 per cent mortality after 24 hours. Neem formulations like neem azal 1 per cent and fortune aza 1.5 per cent were on par with each other. No mortality was observed on control after 24 hours spray. The results obtained from bioassay studies indicated that all the botanicals and pesticides tested against *A.guerreronis* revealed that monocrotophos 0.04 per cent and dicofol 0.04 per cent was highly and effective in killing the mites. This was in accordance with the reports of Shanabasava *et al.* (1999) and Umamageswari *et al.* (1999) as they reported that monocrotophos and dicofol was highly effective against spider mite, *Tetranychus neocaledonicus*. These

Table 1 : Efficacy of botanicals on mortality of <i>A. guerreronis</i> under laboratory conditions					
Sr. No.	Treatments	Per cent mortality hours after treatment*			
		6h	12h	18h	24h
1.	Phytopalm 1 g	13.33c	30.00c	40.00b	80.00bc
2.	Phytopalm 1.5g	20.00bc	63.33a	70.00a	86.66b
3.	Neem azal 1%	30.00ab	53.33ab	63.33a	76.66bc
4.	Fortune Aza 1.5%	36.66a	46.66abc	63.33a	70.00cd
5.	Neem seed kernel extract 5%	23.33bcd	43.33bc	60.00ab	66.66cd
6.	Neem oil 3%	20.00bc	36.66bc	56.66ab	73.33cd
7.	Nochi leaf extract 3%	30.00ab	33.33c	50.00b	52.33d
8.	Calotropis leaf extract 5%	26.66ab	40.00bc	43.33b	60.00d
9.	Monocrotophos 0.04%	40.00a	53.33ab	70.00a	100.00a
	C.D. (P=0.05)	8.36	10.56	11.51	9.79

*Mean values with different alphabets differ significantly

Table 2 : Efficacy of botanicals on mortality of <i>A. guerreronis</i> under laboratory conditions					
Sr. No.	Treatments	Per cent mortality hours after treatment*			
		6h	12h	18h	24h
1.	Phytopalm 1g	16.66c	23.33c	40.00b	63.33c
2.	Phytopalm 1.5g	20.00bc	33.33b	70.00a	80.00b
3.	Neem azal 1%	16.66ab	30.00b	63.33a	63.33c
4.	Fortune Aza 1.5%	33.33bc	40.00abc	63.33a	60.00c
5.	Neem seed kernel extract 5%	20.00bc	33.33bc	60.00ab	63.33c
6.	Neem oil 3%	23.33bc	40.00abc	56.66ab	70.00bc
7.	Nochi leaf extract 3%	26.66abc	43.33ab	50.00b	56.66c
8.	Calotropis leaf extract 5%	20.00bc	30.00bc	43.33b	63.33c
9.	Monocrotophos 0.04%	40.00a	56.66a	70.00a	100.00a
	C.D. (P=0.05)	8.36	10.56	11.51	9.79

*Mean values with different alphabets differ significantly

findings are in conformity with Dey *et al.* (2001)

Who reported that spraying fenazaquin at 10 ml per palm directly on crown region significantly reduced mite population at 8 DAS, followed by dicofol and monocrotophos. However, Muthiah and Bhaskaran (1999) reported that spraying of methyl demeton @ 4 ml/lit. reduced the nuts damage by mites to an extent of 24.9 per cent followed by monocrotophos @ 1.5 ml/lit. which gave 25.1 per cent reduction. Kannaiyan *et al.* (2000) reported that spraying of triazophos 40EC, monocrotophos 36SL @ 5 ml/lit. were effective in reducing population. However, spraying dicofol @ 6 ml per lit. of water at monthly interval gave effective control of mite infestation (Vidyasagar, 2000 and Shivarama Reddy and Naik, 2000). Natarajan *et al.* (2002) reported that spraying of triazophos 40EC 5ml/lit., methyl demeton 25EC 4 ml/l or monocrotophos 36 SL 1.5 ml/lit. was found to significantly reduce mite population and root feeding

of monocrotophos 15 ml + 15 ml water is effective. Nair *et al.* (2002) reported that trials carried out with micronized wettable formulation of sulphur have proved to be successful in controlling mites @ 0.4 per cent concentration. Evaluation of pesticides and biopesticides was carried out in laboratory conditions before going for direct field evaluation.

Among the plant products tested phytopalm (3% and 5%) and phytopalm dust (1g and 1.5g) were more effective. The neem products like neem azal (1%), fortune aza (1.5%), neem seed kernel extract (5%), neem oil (3%) recorded higher per cent mortality.

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