

## OBSERVATIONS ON THE MITE FAUNA ASSOCIATED WITH THE COCONUT PALM IN KERALA, INDIA\*

B. SATHIAMMA

*Central Plantation Crops Research Institute,  
Regional Station, Kayangulam, Krishnapuram - 690 533,  
Kerala, India*

(Manuscript Received: Mar. '95; Revised: Sept. '95, Accepted: Feb. '96)

### ABSTRACT

Sixteen species of mites belonging to fourteen families and four suborders have been recorded from the coconut palm foliage. Two species of spider mites, one species of false spider mite and one eriophyid mite are the important plant feeding ones. The recorded mite predators were phytoseiid, cunaxid and stigmatid mites. Oribatid mites and many unidentified mites were the other fauna present on coconut leaves. A short account on the important mites is given.

### INTRODUCTION

Mites associated with the coconut palm are world-wide in distribution. Nirula (1955), Lever (1969) and Nair (1975) listed several mites as pests of the coconut palm. Kurian *et al* (1979 a, b) prepared a world list of ten species of mites on coconut palm comprising five species of tetranychid mites coming under two genera, one species of tenuipalpid and four species of eriophyid mites. Ghai and Wadhi (1983) listed seventeen species of phytophagous mites including eight species of tetranychid, two species of tenuipalpid and seven species of eriophyid mites. Ohler (1984) in his book on coconut listed two species of eriophyid mites damaging the nuts, as additions to the list given by Lever (1969). Sathiamma (1985, 1986 and 1988) added to this list one species of tenuipalpid and two species of tetranychid mites. Mohanasundaram and Karupuchamy (1989) gave a review on the coconut mites and enlisted twenty species of mites including the occurrence of six new species from Tamil Nadu, South India.

The world list of thirty one acarine fauna on coconut palm comprised eighteen genera and thirty one species of mites, recorded from thirty countries (Sathiamma,

1991). Out of the thirty one species, eighteen are phytophagous, of which eleven species belong to the family Tetranychidae, six to Tenuipalpidae and one to Eriophyidae. These mites infest the foliage, inflorescence and nuts of the palm. Predacious mites co-exist with the phytophagous mites and these are effective biocontrol agents checking the population of injurious mites (Mathen *et al.* 1965, Sathiamma, 1995). Oribatid mites feed on fungi and decaying plant materials. There are many more unidentified mites, whose role is yet to be determined. The information available on these mites is limited and scattered. Hence, detailed investigations were taken up on the phytophagous mite fauna on coconut palm and the present paper summarises the observations on the more common mites associated with coconut palm foliage in Kerala, India.

### MATERIALS AND METHODS

Three hundred and fifty coconut seedlings (one to three year old) located in C.P.C.R.I. Farm at Kayangulam were selected for the study. Ten to twenty leaflet samples were collected at random and examined in the laboratory under a stereomicroscope. The acarine fauna present on these leaflets were collected and identified.

\* Contribution No. 906 Central Plantation Crops Research Institute, Kasaragod,  
Part of the Ph.D. thesis submitted to the University of Kerala, Thiruvananthapuram.

Leaflets infested with the different species of phytophagous tetranychid, tenuipalpid and eriophyid mites were counted and the percentage of occurrence calculated as the ratio of the number of leaflets with phytophagous mites to the total leaflets sampled.

In order to study the distribution of the mites in Kerala, the occurrence of the mites and the associated predators was studied in one location, in seven districts. Five palms were selected in each location and ten leaflets per palm examined for population count.

### RESULTS AND DISCUSSION

Acarine fauna on coconut palm foliage was represented by sixteen species of mites belonging to fourteen families coming under four suborders (Table 1). Besides, a number of unidentified mites were also collected. The phytophagous species identified were *Oligonychus iseilemae* (Hirst) and *Tetranychus ludeni* Zacher (Tetranychidae),

*Raoiella indica* Hirst (Tenuipalpidae) and *Notostrix attenuata* Keifer (Eriophyidae). The false spider mite *R. indica* is one of the major mite pests on the coconut palm, particularly in nursery seedlings, during the summer season. The eriophyid mite *N. attenuata* also occurred on the coconut palm, with no visible injury to the foliage.

Among the associated mite predators, phytoseiid predators were the dominant groups and they occurred in abundance during all the months. Four species of oribatid mites were quite common. Most of them are fungal feeders and occurred frequently on older leaves of the palm as compared to the younger ones.

Examination of the leaflets revealed that phytophagous mites occurred on an average 65.7% of the leaflets (range 19.1 – 96.2%). Occurrence of *O. iseilemae* was on an average 18.9% (range 2.6 - 53.2%) of the leaflets (Table 2). Studies revealed that *O. iseilemae*

Table 1. List of acarine fauna collected from the coconut palm foliage

Suborder	Family	Genus/species
Prostigmata	Tetranychidae	* <i>Oligonychus iseilemae</i> (Hirst)+ * <i>Tetranychus ludeni</i> Zacher++
	Tenuipalpidae	<i>Raoiella indica</i> Hirst+++
	Eriophyidae	<i>Notostrix attenuata</i> Keifer+++
	Cunaxidae	* <i>Cunaxa setirostris</i> (Hermann)
	Stigmaeidae	* <i>Agistemus</i> sp.
	Tydeidae	* <i>Tydeus</i> sp
	Eupodidae	* <i>Eupodes</i> sp
	Mesostigmata	Phytoseiidae
Ascidae		* <i>Lasioseius</i> sp
Acaridae		* <i>Tyrophagus</i> sp.
Astigmata		* <i>Notogalumna praetiosa</i> Sellnick
Cryptostigmata	Galumnidae	* <i>Scapheremaeus arboreus</i> Corpus-Raros
		* <i>Brassiella</i> sp. resembles <i>B. arboricola</i> Balogh
		* <i>Caloppia arboreus</i> Corpus-Raros

\*New record on the coconut palm and new record from Kerala/India.  
Original host record + grass  
++ green house plants  
+++ Coconut

**Table 2.** Percentage of occurrence of phytophagous mites on the coconut palm foliage

Mites	No. of leaflets examined	% occurrence		
		Max.	Min.	Mean
Tetranychidae	1625	96.2	30.3	66.0
Tenuipalpidae	2298	96.1	48.6	74.5
Eriophyidae	2757	87.7	19.1	58.3
<i>Oligonychus isilemae</i>	2587	53.2	2.6	18.9

was distributed in all the seven districts of Kerala state (Table 3). *T. ludeni* was observed in the districts of Thiruvananthapuram, Alappuzha and Kasaragod. These mites were also recorded from Minicoy, Lakshadweep. Among the natural enemies, phytoseiid and cunaxid mites were prevalent in all districts.

#### Biological observations

*O. isilemae*: Commonly known as the white spider mite lived in colony on the lower surface of the leaflets along the midrib under delicate webbing. The immature and adult mites sucked sap from the foliage and the affected portions dried up. They occurred on young and old palms and often posed a problem in coconut nurseries and young palms in the field.

The mite completed its egg to adult period in  $8.3 \pm 0.2$  days. Mean longevity of the adults was  $11.7 \pm 0.5$  days (male) and  $21.2 \pm 0.7$  days (female). Mean fecundity was  $33.9 \pm 1.2$  eggs per female in an oviposition period of  $17.4 \pm 0.7$  days. *O. isilemae* possessed a high biotic potential to multiply rapidly under favourable conditions. This mite occurred in the field during all the months of the year, with peak population during May.

*T. ludeni*. The red spider mite is an occasional pest on coconut palm. Immature and adult mites infested the leaflets and sucked the sap, similar to *O. isilemae*. Excessive draining of the sap by the mites resulted in the drying of the affected portions.

**Table 3.** Distribution of tetranychid mites and the associated predators on coconut palm foliage in seven districts of Kerala State. (Average of ten leaflets per palm and five palms each)

District (Place)	Population of mites			
	<i>Oligonychus isilemae</i>	<i>Tetranychus ludeni</i>	Phytoseiidae	Cunaxidae
Alappuzha (Krishnapuram)	278	1	46	14
Ernakulam (Palluruthy)	52	0	22	1
Kasaragod (Kudlu)	200	4	4	2
Kottayam (Kottayam)	112	0	46	15
Pathanamthitta (Thiruvalla)	72	0	6	1
Kollam (Karunagappally)	249	0	35	7
Thiruvananthapuram (Palode)	184	1	18	1

The egg to adult period is completed in  $9.5 \pm 0.2$  (male) and  $9.7 \pm 0.2$  (male) and  $9.7 \pm 0.5$  (female) days. Males lived for  $7.1 \pm 0.8$  days and females  $12.8 \pm 0.6$  days. Mean fecundity per female was  $9.6 \pm 0.6$  eggs in an oviposition period of  $7.4 \pm 0.5$  days. It occurred in the field during all months, except during June.

*R. indica*. The false spider mite is a serious pest on coconut seedlings in the nursery and young palms in the field. Mites inhabit the lower surface of the leaves in colony and suck sap. Infestation causes yellowing and drying of the leaves and in severe conditions death of the seedlings. Damage is very severe during the summer season. Life cycle is completed in about 33 days. *R. indica* occurs throughout the year with maximum population from January to May period.

*N. attenuata*. This is an eriophyid mite observed on mature, tender and spindle leaves of coconut palm. It occurs on palms of all ages. Population occurred through out the year with maximum population during April-May and minimum during January. No apparent damage was noted on the leaves.

*A. (A) paraaerialis*. The phytoseiid mite occurs on coconut foliage in association with colonies of *O. iseilemae*. The immature and fully grown stages of the predator consumed all stages of the prey. The adult female is a voracious feeder and it consumed 6 to 38 eggs during its developmental period of 4-5 days. Mean fecundity per female ranged from 15-35 eggs during its life period of 10-20 days. Maximum population occurred in the field from March to May. This is one of the dominant predators on *O. iseilemae* and is a new record on coconut and the prey *O. iseilemae*.

*A. (T.) eucalypticus*. This is observed in association with *O. iseilemae* on coconut foliage. This predator is also a voracious feeder on all stages of *O. iseilemae*. The female predator completed its egg to adult

period in 4-5 days. Maximum consumption was 12 prey per predator. In the field, the peak population occurred from March to May. This is also a new record on coconut and *O. iseilemae*.

*C. setirostris*. It is one of the dominant predators of *O. iseilemae*. These are active predators and consumed all motile stages of the prey. Maximum consumption was 31 prey per predator. It completed the egg to adult period in 5-7 days and the fecundity was 22-12 eggs per female. Peak population occurred in March. This predator also consumed small insects including immature stages of scale insects and mealy bugs infesting the coconut leaf. This is also a new record on the coconut palm.

*Agistemus sp.* These are potential predators of tetranychid mites on different crops. The maximum prey consumption by the adult predator on *O. iseilemae* was 31 per predator. The development was completed in 16-22 days. The predator laid a maximum of 12 eggs and the maximum longevity was 17 days. Peak population occurred during March. This is also a new record.

*Lasioseius sp.* These predators are found associated with colonies of *O. iseilemae* and it consumed the immature and adult stages of *O. iseilemae*.

*Eupodes sp.* Fast moving mites and all life stages of the mites occur on coconut foliage. They are present on coconut palm during all the months of the year, with low population from February to May and high population during the other months. During the peak period of occurrence the mean population recorded was 23 mites per leaflet. These mites feed on the immature stages of *O. iseilemae*.

#### ACKNOWLEDGEMENTS

The authoress is highly indebted to late Dr. N.R. Prabhoo, Professor and Dr. V.K.K. Prabhoo, Professor, Dept. of Zoology, University of Kerala, Kariavattom, Thiruvananthapuram for the valuable

guidance in the conduct of the investigations. Grateful acknowledgement is due to the Director, CPCRI Kasaragod; Joint Director, CPCRI, Regional Station, Kayangulam; and

to the Head, Division of Crop Protection, CPCRI, Kasaragod for the encouragement and facilities provided in the execution of the work.

#### REFERENCES

- GHAI, S. and WADHI, S.R. 1983. Phytophagous mites on coconut. *Exotic plant quarantine pests and procedures for introduction of plant materials*, pp. 87-96.
- KURIAN, C., SATHIAMMA, B. and PILLAI, G.B. 1979 a. World distribution of pests of coconut. *FAO of the United Nations. Tech. Document No. 119*, pp. 53. FAO Plant Protection Committee for the South East Asia and Pacific Region. FAO Regional Office for Asia and the Far East, Bangkok, Thailand.
- KURIAN, C., SATHIAMMA, B. and PONNAMMA, K.N. 1979 b. Insects and mites associated with the coconut palm (*Cocos nucifera* L.) pp. 93-236. In: *Nematodes, fungi, insects and mites associated with the coconut palm. CPCRI Tech. Bull. 2*. Central Plantation Crops Research Institute, Kasaragod.
- LEVER, R.J.A.W. 1969. *Pests of the coconut palm*. FAO Agricultural Studies No. 77, pp. 190.
- MATHEN, K. SATHIAMMA, B. and KURIAN, C. 1965. Minute mites play mighty role in agriculture. *Coconut Bull.* 19: 267-272
- MOHANASUNDARAM, M. and KARUPPUCHAMY, P. 1989. A review of the mites attacking coconut and new records of mites on coconut in Tamil Nadu. *Indian Cocon. J.* 20 (5):9-13.
- NAIR, M.R.G.K. 1975. *Insects and mites of crops in India*. Indian Council of Agricultural Research, New Delhi, pp 404.
- NIRULA, K.K. 1955. Investigations on the pests of coconut palm. Part I. *Indian Cocon. J.* 8:118-130.
- OHLER, J.G. 1984. *Coconut, tree of life*. FAO of United Nations, Rome pp. 446
- SATHIAMMA, B. 1985. Record of *Dolichotetranychus vandergooti* (Oudemans) (Acarina: Tenuipalpidae) a perianth mite on coconut. *J. Plantn. Crops* 13: 73-75.
- SATHIAMMA, B. 1986. *Oligonychus iseilemae* (Hirst) and observations on a red spider mite *Tetranychus* sp. on coconut foliage. *J. Plantn. Crops* 14: 71-73
- SATHIAMMA, B. 1988. Record of the red spider mite *Tetranychus ludeni* Zacher (Acarina: Tetranychide) on the coconut palm. *Entomon* 13: 191-192.
- SATHIAMMA, B. 1991. Investigations on *Oligonychus iseilemae* (Hirst) (Acarina) and other tetranychid mites on coconut foliage. Ph. D. Thesis submitted to University of Kerala, Thiruvananthapuram, pp. 1-206.
- SATHIAMMA, B. 1995. Biological suppression of the white spider mite *Oligonychus iseilemae* (Hirst) on coconut foliage. *Entomon* 20: 237-243.