SEASONAL ABUNDANCE OF THE COCONUT WHITE MITE AND ITS PREDATORS

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ABSTRACT

Oligonychus iseliemae (Hirst) (Acarina: Tetranychidae) infests seedlings and grown up coconut palms and inhabits the adaxial surface of the leaflets. They live in colonies and feeding by the immature stages and adults results in draining of the sap and consequent drying of the affected leaves. Severe damage was usually observed in coconut nurseries and just planted seedlings in the field.

O. iseilemae occurred in the field almost throughout the year. Mean population varied from 94 to 803 from January to June and from 4 to 93 during July to December. Among the meteorological factors, high temperature, low relative humidity and long hours of bright sunshine favoured the increase in mite population and rainfall effected a decline. The mite, insect and spider predators coexisted with *O. iseilemae* colony and brought about substantial reduction of the prey population. The dominant mite predators observed were *Amblyseius paraaerialis, A. eucalypticus, Cunaxa setirostris* and *Agistemus* sp.

INTRODUCTION

Mites often appear as minor pests on coconut palm, but occasional sporadic outbreaks can cause substantial damage to the palm. Among these, 12 species belong to the family Tetranychidae, six to Tenuipalpidae and one to Eriophydae (Ghai and Wadhi, 1983; Gupta, 1985; Kurian *et al.*, 1979; Mohanasundaram and Karuppuchamy, 1989 and Sathiamma, 1983; 1985; 1986; 1988). The recorded tetranychid mites on coconut foliage include *Oligonychus indicus* (Hirst), *O. modestus* Banks, *O. plegas* Baker and Pritchard, *O. pratensis* Banks, *O. tylus* Baker and Pritchard, *O. velascoi* Rimando, *Tetranychus fijiensis* (Hirst), *T. ludeni* Zacher, *T. neocaledonicus* Andre and two unidentified species of *Oligonychus* and *Tetranychus.*

The coconut white mite, *O. iseilemae* inhabits the adaxial surface of the coconut leaflets along the midrib in thin webbings. The infestation is mostly

observed on seedlings, but occurs in adult palms as well. The immature stages and adult mites suck sap from the leaflet resulting in the drying up of the affected portion. The damage and drying is often observed in the coconut nursery and transplanted coconut seedlings in the main field.

Studies were carried out at the Central Plantation Crops Research Institute, Regional Station, Kayangulam, Kerala, during 1985 and 1986 on the seasonal occurrence of *O. iseilemae* and the associated predators and the results are summarised in this paper.

MATERIALS AND METHODS

The seasonal variation in population of *O. iseilemae* was studied on 10 randomly selected, three- to four-year old coconut seedlings at the rate of two sample leaves per seedling, at fortnightly intervals, for a period of two years. Population of egg, larva, protonymph, deutonymph and adult mites present on each of the leaflets of the two leaves/seedling was counted and the mean population per leaf for every fortnight was converted to monthly data. Data on the predators associated with *O. iseilemae* population on the leaflet were recorded. Maximum and minimum temperatures, relative humidity, rainfall and sunshine were collected from the meteorological observatory of the Institute.

RESULTS AND DISCUSSION

Population of *O. iseilemae* occurred in the field during all months of the year (Fig. 67.1). High population (mean population being 94 to 803 per month) was observed during the period from January to June and low (4 to 93 per month) from July to December. The build up of the population commenced from January, gradually increased and reached its peak in May. Thereafter, it declined and reached a very low level in July and continued to maintain almost a low population till December. Predator fauna and weather parameters played a significant role in the build up/decline in population of *O. iseilemae*

The mite, insect and spider predators, particularly, species belonging to the families Phytoseiidae, Cunaxidae, Stigmaeidae, Coccinellidae, Cecidomyiidae and Clubionidae, coexisted with *O. iseilemae* colony, with the seasonal incidence almost coinciding with that of the prey population (Fig. 67.1). The dominant mite predators identified were *Amblyseius paraaerialis* Muma and *A. eucalypticus* Gupta (Phytoseiidae), *Cunaxa setirostris* Hermann (Cunaxidae) and *Agistemus* sp. (Stigmaeidae). The phytoseiid predators occurred in the field during all months of the year, except July, with maximum population during March to May period, when the prey population was also abundant. Maximum population of *C. setirostris* was present during March and May, with a peak in March. *Agistemus* sp. was also abundant during March. The predator population was either quite low or absent during the latter part of the year. The population of the insect predators was low during most months of the year, but

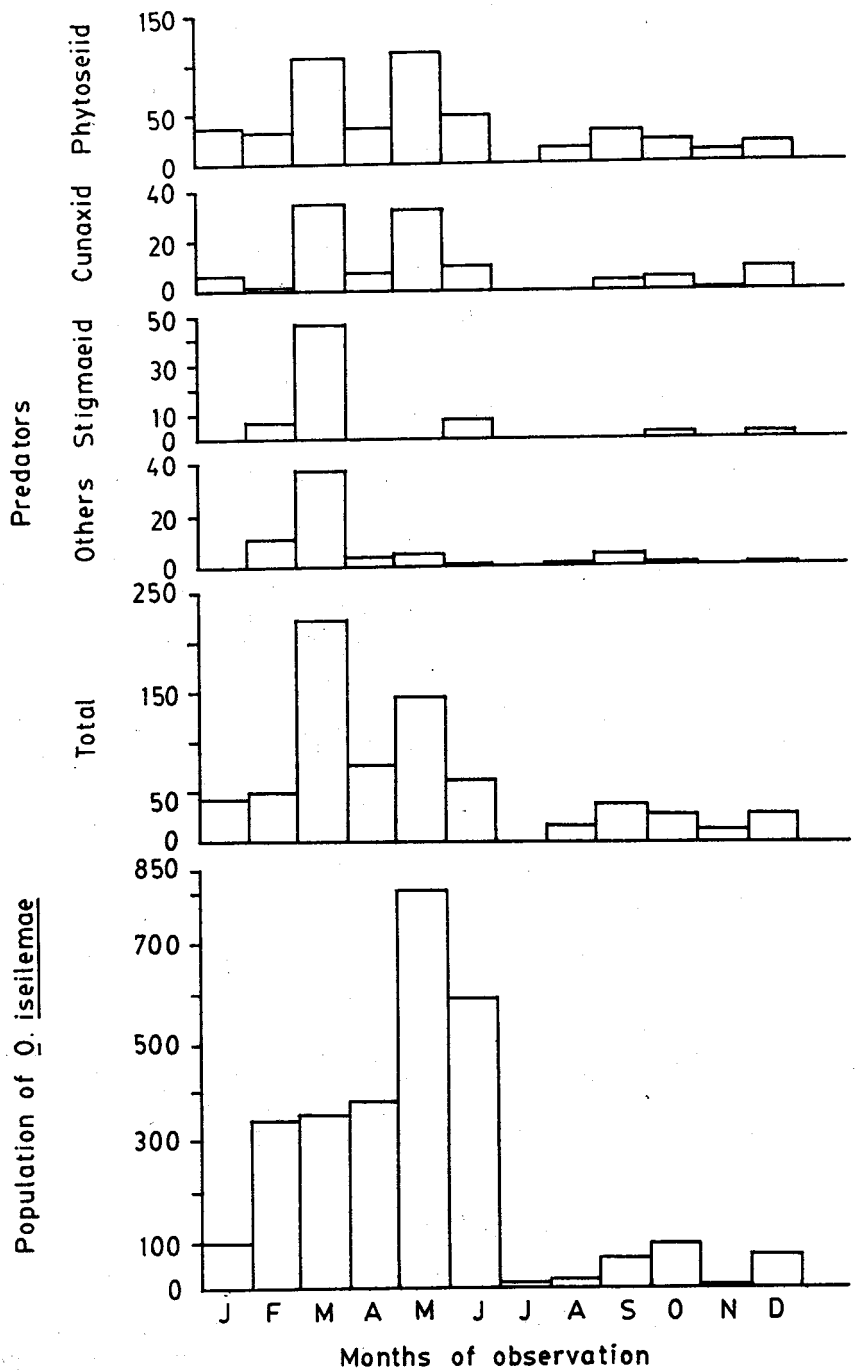

Fig. 67.1: Fluctuations in population density of *Oligonychus iseilemae* and the associated predators.

together with the spider predators they contributed effectively to the biosuppression of the population of *O. iseilemae*.

The incidence of the predators, particularly, the phytoseiid predators, followed a similar pattern as that of the prey population. With build up of *O. iseilemae* population in January, the predator fauna also multiplied in large numbers and reached the peak level in March and suppressed the rapid increase in the prey population. With the decline in population of the predators in April, the prey population increased numerically and reached the peak density in May. Again, the predator population also increased and effected a substantial reduction in prey population. With the decline in prey, during June and July only a low population of the predators survived in the field.

Considering the weather parameters (Fig. 67.2) higher maximum (31° to 34°C) and minimum (21° to 25°C) temperatures, low relative humidity (87 to 91 per cent) and longer hours of bright sunshine (176 to 283 hours) occurred during the months from January to May. During July to December low maximum (27° to 33°C) and minimum (21° to 24°C) temperatures, high relative humidity (93 to 94 per cent) and shorter sunshine hours (126 to 262 hours) was observed. Rainfall was high (165 to 443 mm) from May to November and low (19 to 115 mm) from January to April and December. Maximum rainfall occurred during May and July (296 and 443 mm, respectively). It was observed that high maximum temperature, low relative humidity and longest hours of bright sunshine favoured the incidence of spider mite fauna and maximum rainfall suppressed the population.

It was concluded from the studies that the predator fauna and weather factors were responsible for almost 71 per cent of the variations in population of *O. iseilemae*. A combined effect of the effective indigenous predators and the weather parameters maintained the spider mite population on coconut foliage at a low level, before attaining severe proportions and damaging the crop.

Similar observations on the coconut red mite *Raoiella indica* Hirst (Tenuipalpidae) also gave a positive correlation with temperature and bright sunshine hours and negative correlation with rainfall and relative humidity and mite population and these factors effected 69 per cent of the fluctuations in field population of *R. indica* (Nageshachandra and Channabasavanna, 1983).

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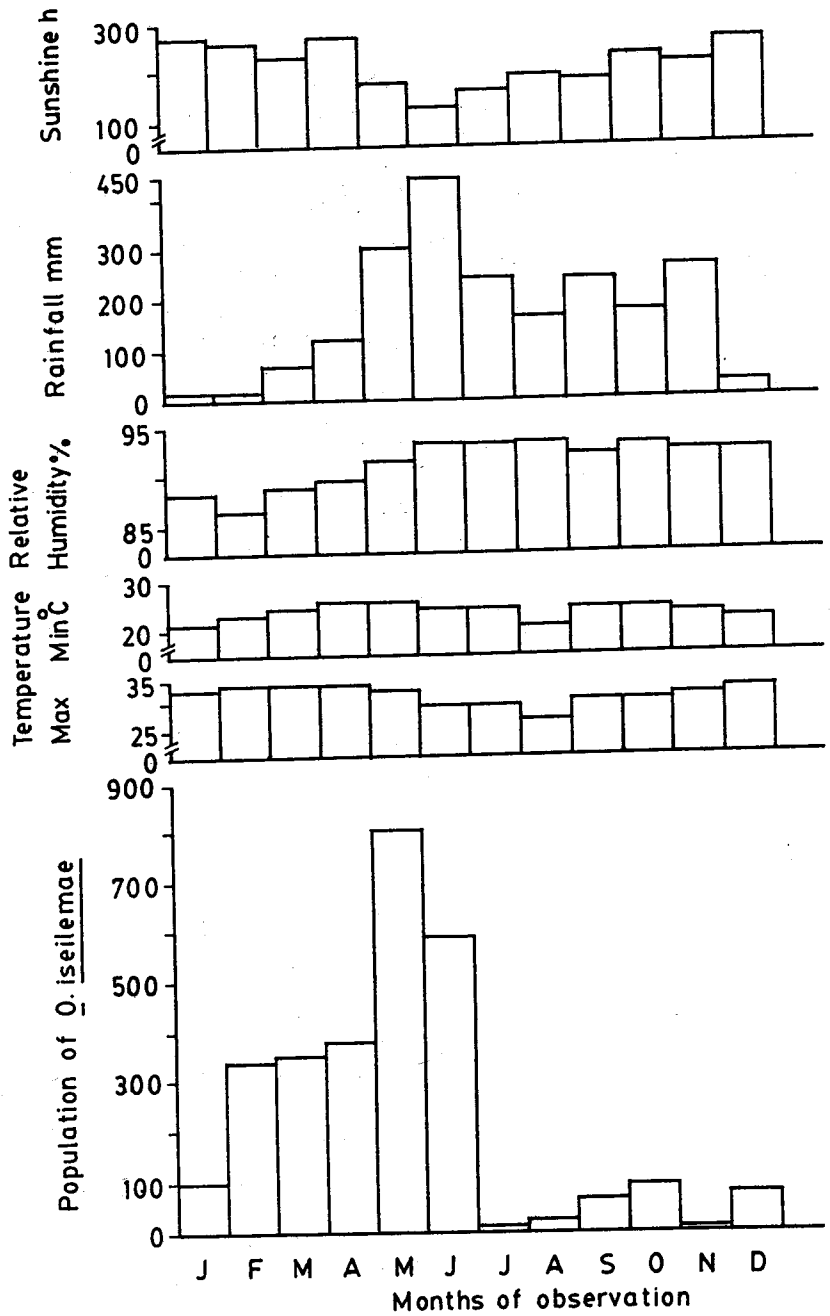

Fig. 67.2: Fluctuations in population density of *Oligonychus iseilemae* in relation to the meteorological factors.

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.

Gupta, S.K. 1985. *Handbook Plant Mites of India*. Zoological Survey of India, Calcutta, pp. 519.

Kurian, C., Sathiamma, B., Pillai, G.B. and Ponnamma, K.N. 1979. Insects and mites associated with the coconut palm (*Cocos nucifera* L.) In: *Nematodes, fungi, insects and mites associated with the coconut palm.* CPCRI Tech. Bull. **2**: 93–236.

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.

Nageshachandra, B.K. and Channabasavanna, G.P. 1983. Studies on the seasonal fluctuation of the population of *Raoiella indica* Hirst (Acari: Tenuipalpidae) on coconut with reference to weather parameters. *Indian J. Acar.* **8**: 104–11.

Sathiamma, B. 1983. Mite fauna associated with coconut palm in Kerala. pp. 11–14. In: *Contributions to Acarology in India*. Channabasavanna, G.P. (Ed.). Acarological Society of India, Bangalore.

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: Tetranychidae) on the coconut palm. *Entomon.* **13**: 191–192.