SUMMARY AND CONCLUSIONS
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The coconut palm *Cocos nucifera* L. is one of the important perennial oil seed crops of the tropics and it is the most widely cultivated species of palm. Many species of insects, mites and nematodes were recorded as pests of the coconut palm.

Mites are world wide in distribution and have been recorded from thirty one coconut growing countries of the world. The world record comprises thirty eight mites belonging to nineteen genera and thirty two species. Among these, twelve species belong to the family Tetranychidae.

The present observations recorded *Oligonychus iseilemae* and *Tetranychus ludeni* as new species of spider mites on the coconut palm foliage. These species were found distributed in seven districts of Kerala.

Both the species infested the adaxial surface of the leaflets, more towards the mid rib region. Feeding by the immature and adult stages of these spider mites caused drying of the affected leaflets.

*O. iseilemae* and *T. ludeni* were found to be amenable to laboratory multiplication, both on coconut and on alternate hosts.

Reproduction arrhenotokous. *O. iseilemae* completed its life cycle in $8.29 \pm 0.17$ and $8.31 \pm 0.17$ days by the male and female,
respectively. Male progeny emerged first in a colony, but female progeny outnumbered the male progeny. Male: female ratio was 1 : 2.

*T. ludeni* completed its life cycle in $9.50 \pm 0.24$ days (male) and $9.73 \pm 0.52$ days (female) with a male : female ratio of $1 : 3.2$.

Mean life span of *O. iseilemae* females was $21.16 \pm 0.69$ days and males $11.73 \pm 0.48$ days. *T. ludeni* females lived for $12.80 \pm 0.58$ days and males $7.06 \pm 0.83$ days.

Maximum number of eggs laid by *O. iseilemae* was $33.92 \pm 1.18$ eggs in an oviposition period of $17.42 \pm 0.68$ days and that of *T. ludeni* was $9.60 \pm 0.60$ in an oviposition period of $7.40 \pm 0.45$ days. Eleven to twenty day old females of *O. iseilemae* produced the maximum number of eggs.

Life table studies revealed that population of *O. iseilemae* female was capable of increasing to $21.12$ times after a single generation, in a mean generation time of $15.96$ days and an intrinsic rate of natural increase of $0.1912$. *O. iseilemae* possessed a high biotic potential to multiply rapidly under favourable conditions.

Isolated females of *O. iseilemae* reared on coconut leafbits lived long, had long oviposition period and had high fecundity whereas, crowded conditions reduced the longevity, oviposition period and fecundity.

West Coast Tall, Kulasekharam Dwarf Orange and Malayan Dwarf Orange coconut palms were susceptible to infestation by *O. iseilemae* and West Coast Tall was observed to be the most susceptible.
Nineteen plants grown either as weeds or as intercrops in coconut gardens were screened and twelve of them were found susceptible to infestation by *O. iseilemae*. Significant difference was observed in the egg to adult period, female longevity and fecundity, when the mites were reared on these host plants. Mites had the shortest egg to adult period, long life span and high fecundity on sorghum and hybrid napier as compared to the coconut palm.

*O. iseilemae* and *T. ludeni* infested both young and old coconut palms. *O. iseilemae* infested 39.9% of the leaves and 15.5% of the leaflets, the mean population per palm was 178.5, per leaf 51.6 and leaflet 5.7. *T. ludeni* infested 70% of the leaves and 4.7% of the leaflets, the mean population per palm was 49.3, per leaf 15.6 and per leaflet 5.4.

Middle whorl of leaves harboured the maximum (48.2-63%) of the population of *O. iseilemae*. Mites concentrated in the middle portion of the leaf (41.0-45.5%) and the leaflet (47.4-49.6%). Forty-six per cent of the *T. ludeni* population occurred in the middle portion of the leaves and 50.5% of the population concentrated in the middle portion of the leaflet.

*O. iseilemae* and *T. ludeni* were observed on all the leaves on the palm crown, but not for the central unopened spear leaf.

*O. iseilemae* occurred in the field during all months of the year, with peak population during May. *T. ludeni* was observed during
all the months, but for June, with maximum population during January to February period.

Fortnightly counts on field population density of *O. iseilemae* and the associated predators for a period of two years revealed that build up of population of *O. iseilemae* commenced from January, reached its peak in May and declined thereafter. Population of the predators also followed an almost similar pattern. During the peak period of the prey (May) the predator – prey ratio was 1 : 5.7.

Among the mite predators, population of phytoseiid appeared abundant. Cunaxid and stigmaeid population were quite low. Peak period of abundance of the prey and the phytoseiid predators was observed during May. The other predators comprised predacious insects and the spiders. Individually these predators appeared non-significant, but collectively they exerted a high degree of regulatory pressure on the prey population. They were capable of multiplying in large numbers and maintaining the prey population at a low level during most months of the year.

Among the weather factors studied, maximum temperature and low relative humidity favoured the build up of *O. iseilemae* population and rainfall effected a decline.

Correlation co-efficients were worked out to study the role of predators and the weather parameters in the build up of population of *O. iseilemae*. Significant positive correlation was obtained with
the predators and weather parameters (maximum temperature and low relative humidity) and significant negative correlation with rainfall and mite population.

Multiple regression models also revealed that 71% of the variations in population could be explained by all the variables studied. Predator variables and weather variables explained, respectively, 68% and 50% of the variations in field population of O. isolemae.

Natural predator complex of O. isolemae comprised six species of mites, two species of insects and one species of spider. The phytoseiid predators Amblyseius (A.) paraeerialis and A. (T.) eucalypticus; the cunaxid Cunaxa setirostris and the stigmaeid Agistemus sp. were the major mite predators.

These predators consumed all stages of the prey and the maximum consumption by A. (A.) paraeerialis was twenty one prey per predator, A. (T.) eucalypticus twelve prey per predator and C. setirostris thirtyone prey per predator.

The predators had a short egg to adult period as compared to that of the prey. Phytoseiid predators completed their life cycle in 4-5 days and the cunaxid predator in 5-7 days as compared to 7-10 days of the prey.

Insect predators comprised Coccinellidae, Cecidomyiidae, Chrysopidae and Thysanoptera. Only a low population occurred in the field. Chrysopid larvae also consumed different stages of T. ludenti in the field.
Immature stages of the predacious spider *Cheiracanthium* sp. consumed all stages of *O. iseilemae* and *T. ludeni* in the field. Maximum population of the predator was observed from December to March.