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Coconut Risk Management and Mitigation Manual for the Pacific Region

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8. MITES (ACERIA GUERRERONIS)

By N. S. Aratchige, L. C. P. Fernando and R. Bourdeix

Description

The risk is for this mite *Aceria guerreronis* Keifer to reach the Pacific region, to become epidemic and to reduce the size of the fruits and yields by as much as 15- 20%.

Over the past 50 years, the coconut mite, *Aceria guerreronis* Keifer has emerged as one of the most important invasive pests of coconut in many coconut growing countries in the Americas, Africa and Asia. Although not properly documented yet, symptoms like coconut mite damage were observed in coconut fruits in Thailand. The coconut mite has not been recorded yet in the Indo-Pacific region, the area of origin of coconut, suggesting that it has infested coconut only recently. Recent studies suggest an American origin of the coconut mite and lend evidence to a previous hypothesis that the original host of the mite is not a coconut palm.

The adult coconut mite is tiny, only 0.20- 0.25 mm long by 0.03– 0.05 mm wide, yellowish white in colour and worm-like. Eggs are small, white and round to oval. Mean length of the life cycle from egg to adult is about 10 days. Their small size, worm-like body and high reproductive performance make the coconut mites one of the most intractable pests in the world. They colonize the bract-protected region under the coconut perianth, the so-called meristematic region of the fruit. The coconut mites avoid predation by using habitats that are difficult for predators to access. The coconut bracts apparently also provide protection against the direct action of many of the acaricides sometimes used against the coconut mite. The coconut mites are dispersed into new areas mainly through wind currents and possibly by infested fruits. However, the possibility of initiation of new infestations through dispersing on insects such as honeybees that visit coconut inflorescences has also been suggested. Once introduced into new areas, the coconut mite tends to establish permanent infestations, mostly in population outbursts in a short time.

The coconut mite is found in Asia, Africa and America (Central, North, South and the Caribbean), but not yet in the Pacific region. Apart from coconut, it has been reported only from three other palm species. Two of them, (*Lytocaryum weddellianum* (H. Wendl., cited as *Cocos weddelliana* H. Wendl. and *Syagrus romanzoffiana* Cham.) are palms of South American origin and are used as ornamentals. In the Indo-ocean region, the coconut mite was reported on palmyra palm, also called wine palm or ice apple (*Borassus flabellifer*) and in Areca palm in India and Sri Lanka.

The coconut mite can colonize fruits of any age, but peak populations have been observed on 3-6 month old young fruits (i.e., fruits 3- 6 months after fertilization). The coconut mites are not evenly distributed among the coconut bunches in a palm and within the coconut palms in the field.

Occurrence and severity

Early damage caused by the coconut mite is progressively visible as a triangular white patch arising from the margin of the perianth, which is specific to *A. guerreronis*. As the infested fruits grow, the damaged tissue turns necrotic, brown colour and corklike, sometimes with deep fissures and gummy exudates. Infested fruits later become distorted with stunted

growth. Coconut mite infestations can also cause extensive premature fruit drop, reduction in coconut fibre length and tensile strength and the reduction in husk availability for the coir industry.

Symptoms of the coconut mite infestation on coconut fruits differ from those of other phytophagous mites that are found on coconuts, such as *Dolichotetranychus* sp., *Amrineus cocofolius* Flechtmann, *Colomerus novahebridensis* Keifer, *Steneotarsonemus concavuscutum* Lofego & Gondim Jr. and *S. furcatus* De Leon. Usually, the other herbivorous mites that have been reported on coconut fruits are reported to produce symptoms that are characterized by a necrotic transverse strip whose proximal margin is not in contact with the perianth or the strips that encircle the whole fruit (commonly referred to as 'ring spot') or a rectangular patch extending from the margin of the perianth, but never typically triangular.

In Sri Lanka, the yield loss in affected areas varies from 2- 15%. The value of de-husked fruits also could be reduced by 30- 40%. In some countries, losses vary according to seasons, with higher attacks during dry periods.

Mitigation and adaptation

If the mite infestation is reported in few palms in an area for the first time, cut and burn all bunches in the infested palms, and possibly spray with 2% sulphur 80WP to wet the crown region of infested and surrounding palms.

More than 50 chemicals and mixtures have been tested worldwide to control this pest, but only a handful of chemicals have been reported to be at least partially effective. Systemic insecticides were more persistent, but the residues have been observed in fruits. See the paper 'The coconut mite: Current global scenario' in the 'References' section for details.

For biological control, pulverization of coconut, babassu, oil palm or degummed soybean oils are used in Brazil and India to control the mite. These oils have side effects on the predatory mite *Neoseiulus baraki*, a key natural enemy of the coconut mite, but they are more toxic for the mite than for its predator. In Sri Lanka, the predatory mite, *N. baraki* is recommended to control the coconut mite. Release of laboratory reared *N. baraki* at the rate of approximately 5000 mites brought to the plantation on one in four palms, at 3- 4 month intervals during the seasons without rainfall, results in lower percentage of small fruits and increased kernel thickness in the harvest.

An emulsion of 20% palm oil and 0.5% sulphur 80WP (palm oil 200 ml, water 200 ml, soap powder 12 g (2 tablespoons), aqueous sulphur 80% 5 g (1 tablespoon) was found to be effective in controlling the coconut mite in Sri Lanka. The spraying of this emulsion on to the crown of affected palms with a modified knapsack sprayer at six month intervals significantly increased the undamaged fruits and decreased the damaged, small-sized fruits in the harvest. Application of this emulsion not greatly affect *N baraki*, the predatory mite of the coconut mite. The modified sprayer can be operated on the ground with an extended output tube tied on to the top end of a bamboo stick at the required height. With this sprayer two people can spray palms up to the height of 12 m. Application of this mixture once in every six months (or 3- 4 months in drier areas) reduces the mite damage up to 90%.

In India, commercial formulations of *Hirsutella thompsoni* Fisher such as 'MYCOHIT' are available. A holistic approach to control the coconut mite by incorporating cultural practices (correct fertilizer application, moisture conservation and irrigation during drought, use of organic manure) that improve palm vigour can also be recommended.

In Sri Lanka, screening of coconut varieties with different susceptibility levels of coconut fruits to coconut mite damage has revealed that the varieties that are less susceptible to coconut mite damage are more roundish in shape and they show differences in plant volatiles and epicuticular waxes. These volatiles and waxes are either absent or produced in low amounts in susceptible varieties such as the Sri Lankan Green Dwarf.

Actions to undertake

- Variation among coconut varieties in response to coconut mite damage needs to be further studied. Perianth in smaller fruits is less firmly attached to the fruit enabling mites to access interspace between the fruit and the lower perianth lobes for colonization, whereas in larger fruits this gap is mostly impenetrable. Further, it was observed that on infestation, some palms resist damage by increasing the perianth-fruit gap that makes the coconut mites uncomfortable to settle, while exposing them to predators.
- Quarantine aspects need further study. The coconut mite can survive for 3 weeks on a dry coconut. Therefore, trans-boundary movement of coconut needs strict quarantine supervision. We met mariners who, 20 years ago, took back coconut seednuts from America and planted it in Fakarava atoll, French Polynesia.
- Biological control needs further study. Given the fact that the coconut mite is either absent or occur in very low populations in the Pacific region, some efforts should be dedicated to study the natural enemies in that region. Predator performance of the mite may be impaired by the presence of a second prey species.
- In Moorea Island, damage observed by R. Bourdeix and on nuts of the Compact Red Dwarf Variety looked similar to mite attacks. This needs further observation by a qualified entomologist.

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