

Raoiella indica (Red Palm Mite)

Order: Trombidiformes (Itch, Gall and Palm Mites)

Class: Arachnida (Spiders, Scorpions and Mites)

Phylum: Arthropoda (Arthropods)



Fig. 1. Red palm mite, *Raoiella indica*.

[<http://www.reportapest.org/pestlist/raoind.htm>, downloaded 22 May 2015]

TRAITS. The red palm mite has a bright red colour and long body setae (hairs), usually with a liquid droplet at the tips (Fig. 1). The red colour is characteristic of all life stages and adult females can display patches of black along their backs. Adult females average 0.18mm wide and 0.25mm long. They are oval in shape and after feeding, the females show dark markings on the back. The only difference between the male and female is that the posterior end in the male is tapered. Adult females are bigger than males and move less.

DISTRIBUTION. Prior to the emergence of *Raoiella indica* in the New World, it was located in Reunion, Philippines, Israel, India, Mauritius and Egypt. It was identified first in St. Lucia, then in Martinique, Dominica, Trinidad and Tobago, Guadeloupe, and Saint Martin from 2004-2006 (Kane et al., 2012). The mite was distributed widely in St Lucia via coconuts, and on Dominica

by bananas. The swift dispersal of the red palm mite has raised expectations that it will soon be established in other western hemisphere subtropical regions.

HABITAT AND ACTIVITY. Colonies of *Raoiella indica* are established mostly along the midrib on the underside of leaves. The reddish mites are easily seen on leaves that are green. They are most effective at high mite densities and their activity causes leaf yellowing and necrosis of the tissue. Characteristics of symptoms caused by the mite activity are the commencement of small yellow spots on the under surface of the leaflet which then worsens into chlorosis spots that are larger (Fig. 2). The coconut leaflet changes from a bright green to a pale green followed by yellow after which a copper-brown develops. The mite targets quite a few fruit-producing and ornamental palm species, including areca palms and coconut palms. In addition, *R. indica* has been discovered striking Caribbean plantains and bananas (Fig. 3). Young and old coconut trees are seriously affected by the mite resulting in most of their lower leaves becoming yellow. The mite was able to make its way on to the destruction bananas from coconut because they are both grown together in Dominica so it was able to find a new host. *Raoiella indica* favours sunny conditions on palms, where it is hot and dry.

FOOD AND FEEDING. The red palm mites are all feeders of plants. They have a stylophore, utilized for the piercing of tissues of the plant. It also has whiplike chelicerae to make piercing the plant tissue easy. The chelicerae are inserted into the plant tissue at which point the contents of the cell can now be removed through the stomata of the leaves. Red palm mites are found on the underside of leaves of ornamental and fruit-producing palms and therefore have constant access to a food source. They are able to crawl to different parts of the same tree or different trees (wind dispersal) in order to access the nutrients.

POPULATION ECOLOGY. The adults of red palm mites are usually visible to the naked eye. *Raoiella indica* lives on the underside of coconut leaves in groups of a few individuals to hundreds. The egg colonies of red palm mites range from 110-300. There are a few females with eggs placed in a circle in early infestations but in older colonies, the majority of the eggs are deposited around the perimeter. On the inner portion of the colony, there are cast skins. Groups of mites are found in numbers ranging from 20-300 individuals. This number includes larvae, protonymphs, and deutonymphs. Most of the time in a colony that is active, there are female and male deutonymphs in tandem. This is unique to the red palm mite because that type of courtship behaviour is rare for other mite species.

REPRODUCTION. This species can reproduce in two ways. They are via parthenogenesis, in which unfertilized eggs develop into males that are haploid, and sexually which produces females only (Chandra and ChannaBasavanna, 1984). 23-28 days is necessary for the life cycle from egg to adult in females while males require 20-22 days. A mean of 18 eggs is deposited by unmated females. One month is the approximate length of life of an adult and 22 days is the average length of life for males produced by unmated females. The egg is ovoid in shape. It measures 0.1mm in length and 0.08mm in width. When the egg is freshly laid, it attaches to the surface of the leaf with a long, slender hair-like structure located at one end. Fertilized eggs have an incubation period of eight days on average while unfertilized eggs have an average of 7.3 days. The larva has legs in three pairs when freshly hatched. The dorsal, posterior end may

display a blackish tinge after feeding. Before becoming quiescent, the larva feeds for 3-5 days. The quiescent stage lasts 1.7-1.9 days before the larva moults and enters the protonymphal stage. The protonymph has four pairs of legs. Prior to quiescence, the protonymph feeds for 2-5 days. Quiescence has a duration of 1-4 days which is followed by the emergence of the deutonymph from the exoskeleton. Female protonymphs are ovoid in shape while the male is almost triangular. Deutonymphs are larger than protonymphs. They are, however, similar to protonymphs with respect to habits. 2-5 days is the duration of the active phase and the duration of the later quiescent phase is 2-4 days.

BEHAVIOUR. Several predators such as the lady beetle are known to prey on *R. indica*. A clear fluid is located in large droplets at the end of most dorsal setae, possibly for defensive purposes (Kane et al., 2012). A male will settle close to a female deutonymph when he locates her at the quiescent stage and wait for her to moult which lasts approximately two days. The female deutonymphs' moult commences and is followed by the male mite becoming active and moving beneath her. The male bends his posterior forward and upwards to mate.

APPLIED ECOLOGY. When the palm trees are too high, chemical control is strenuous and costly. However, the chemical control is very much necessary in order to keep the mites under control if they are present in nurseries containing palms that lack sufficient natural enemies. It is presently not known what chemicals are suitable to use to rid trees of the red palm mites. In the eastern hemisphere, possible useful biological control agents have been discovered, including lacewings, predatory mites and predatory beetles as well as other mite predators. The red palm mites' impact on the western hemisphere is unpredictable although efforts to generate more details and answers to this invasive pest are being studied.

REFERENCES

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Fig. 2. Effects of the red palm mite on palm leaf.

[http://entnemdept.ufl.edu/creatures/orn/palms/red_palm_mite04.jpg, downloaded 26 April 2015]



Fig. 3. Effects of the red palm mite on the leaves of banana trees.

[http://www.freshfromflorida.com/var/ezdemo_site/storage/images/media/images/plant-industry-images/raoiella-indica-montage-2/480229-1-eng-US/raoiella-indica-montage-2.jpg, downloaded 24 April 2015]