



First record of Phoretic Mite from Red Palm Weevil *Rhynchophorus ferrugineus* (Olivier, 1790) from Basrah, Southern Iraq

¹Shurooq Abdullah Najim   ²Hussain Ali Jabbar   ³Basil Yousuf Mahdi  

¹Department of Ecology, College of Sciences, University of Basrah, Basrah, Iraq.

^{2,3}Department of Plant Protection, Basrah Agriculture Directorate, Basrah, Iraq.

*Corresponding Author: shurooq.najim@uobasrah.edu.iq

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Abstract

The red palm weevil *Rhynchophorus ferrugineus* (Olivier, 1790), which belongs to the family Curculionidae, order Coleoptera, is one of the most important palm pests, which leads to heavy losses in date palms. In the last few years, it has been recorded in Iraq, from Safwan city south of Iraq, where it was detected on date palm trees (*Phoenix dactylifera* L, Arecales: Arecaceae). In the current study, specimens of adult weevils were collected from infested date palms (*Phoenix dactylifera*), that showed signs of infection in Safwan district, south of Basra province. The results of the investigation showed the presence of phoretic mites associated with the red palm weevil *Rhynchophorus ferrugineus* (Olivier, 1790). Two genera of Uropodid mites, deutonymph, were attached by anal pedicel to body parts of adult red palm weevils. They were collected and identified as Centrouropoda (Uropodidae), and Uroobovella (Urodinychidae), according to accurate taxonomic keys. The differentiation between two genera of mites was studied. The deutonymphs were examined and photographed by an AM Scop camera installed on a light microscope, and the insects were photographed by a LEICA microscope. The infestation symptoms were illustrated with pictures.

Keywords: *Centrouropoda* spp. *Uroobovella* spp, Basrah, Iraq, date palm, red palm weevil.

1. Introduction

The red palm weevil *Rhynchophorus ferrugineus* (Olivier, 1790), which belongs to the family Curculionidae, order Coleoptera, is one of the most important palm pests, which leads to heavy losses in date palms. This pest has been recorded in many Asian countries, including Iraq [1, 2, 3, 4].

In the last few years, it has been recorded in Iraq, from Safwan city, south of Iraq, and was detected on date palm trees (*Phoenix dactylifera* L, Arecales: Arecaceae) [5, 6, 7].



Several species of mites have a stable or occasional symbiotic relationship with insects of various orders. Members of several mite families attack coleopteran insects.

The phoretic mites, which hitch a ride on more mobile animals to get from one place to another, exhibit this behavior known as phoresy, or, in other words, commensalism rather than parasitism, but the dense accumulation of these mites may weigh down their insect carriers, causing a reduction in their fitness and sometimes death [8, 9, 10].

The genus *Uroobovella berlese* (1903), one of the largest Uropodinae genera, contains more than 250 species worldwide [11, 12]. It can be identified by some morphological features, such as: a body without hypertrophied setae forming baskets shaped around the dorsum; internal malae with short marginal fimbriations; peritreme well developed; the *Centropoda berles* (1916) has at least 9 species that have been recorded from the tropics [11, 13]. The general morphological characters of this genus are: coxae of leg I usually widened and flattened, covering partially or entirely the base tri-tosternum; chelicerae without internal sclerotized node; marginal setae one or two pairs [14].

The genus *Centrouropoda* was recorded for the first time in the USA as associated with *Rhynchophorus palmarum* (Coleoptera: Curculionidae) [15, 16, 17]. Both the genus *Uroobovella* and *Centrouropoda* were recorded on individuals of *Rhynchophorus phoenicis* from the Congo [18, 19].

The current study aims to identify the parasites of the red palm weevil and to find new methods of biological control using phoretic mites.

2. Materials and Methods

The specimens were collected from infested date palms (*Phoenix dactylifera*) that showed signs of infection from the Safwan district south of Basra province (coordinates N 30°6' 58.4 E 47° 39' 12"), during the period from 1 December 2020 to 1 March 2021. The two genera of mites were identified according to morphological characters described in many studies [20, 21, 22, 23, 24, 25].

2.1. Symptoms of injury by the red palm weevil (Fig. 4)

In the first stage of infestation, a sticky substance of bright red appears at the bases of the leaves, and when the infection develops, holes appear in the bases of the leaves from which sawdust comes out. When the bases of the leaves were removed by means of the electric saw, the incomplete and adult stages appeared in the transporting vessels of the date palm tree. The specimens were collected by hand and put in containers with 75% alcohol and ethyl.

2.2. Mite identification and distribution pattern:

The specimens of insects (weevils) were investigated carefully under the dissecting microscope, and the mites were separated from different parts of the insect. (elytra and thorax, as in **Figure 1**) by a soft brush and deposited in 70% ethanol, the mites were cleared and mounted in Hoyer's solution to prepare a permanent microscope slide for identification by a compound microscope under 40x power. The specimens of insects were photographed by a Leica EZ4HD microscope,

while the mites were studied and photographed by an AM SCOPE camera installed on a light microscope (Novel).

Note: All collected specimens were deutonymphs, so it is difficult to identify the species; the diagnosed samples are the genus only.

2.1. Measurement of Parameters

The chemokine (MCP 1) value was measured by ELISA technique according to the kit procedure (cat no. ELK5252, to company ELK Biotechnology) of Chinese origin. Hormones (testosterone, LH, prolactin, and FSH) were measured by an American Abbott Architect plus i1000SR device based on ECLIA technology using a special kit for each parameter. Also, BMI was measured according to the equation of weight divided by height squared.

3. Results and Discussion

The identification was based on morphological characteristics, size of specimen, color, anal pedicels, and mite fixation locality on the red palm weevil body.

The most abundant genus was *Centrouropoda*, Barlese, 1917 (Mesostigmata: Uropodidae). It has been collected from Elytra, and nearly 250 individuals were collected from five specimens of red palm weevils (**Figure 1**).

Nearly 90 specimens of the genus *Uroobovella* Barlese (1903) (Mesostigmata: Urodinychidae) were collected from five red palm weevils.

The deutonymph of *Centrouropoda* Barlese, 1917, is differentiated by its short, broad, and dark brown anal pedicel (**Figure 2**). The specimens of *Uroobovella*, Barlese, 1903 were found adhered by long, flexible, slim, pale, and brown anal pedicels to the pygidium (**Figure 3**).

In previous studies, references illustrated the effect of this type of mite on the biological activity of palm weevils. The study mentioned that large numbers of mites may limit the ability of the insect to fly [26] and considered that mites may have a role in feeding on weevil larvae and making them a source of protein.

In the same context, [27, 28, 29, 30] reported that phoretic mites act as parasites on their respective hosts. But many studies must be done in this subject to determine if this mite can be used in biological control programs to control the red palm weevil.



Figure 1. Red palm weevil with phoretic mites.

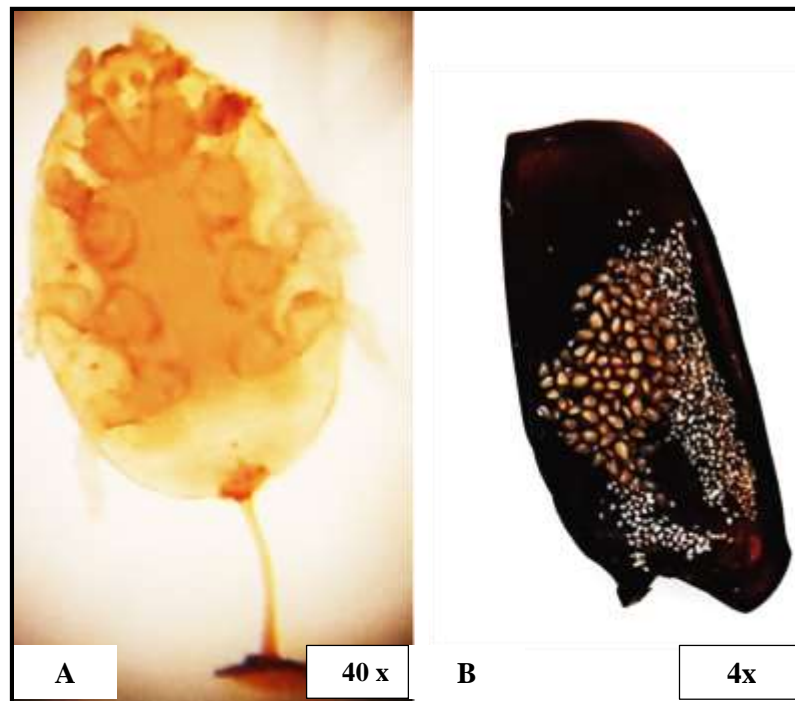


Figure 2. A: Deutonymph of genus *Centrouropoda*, B: Elytra of red palm weevil with phoretic mites.

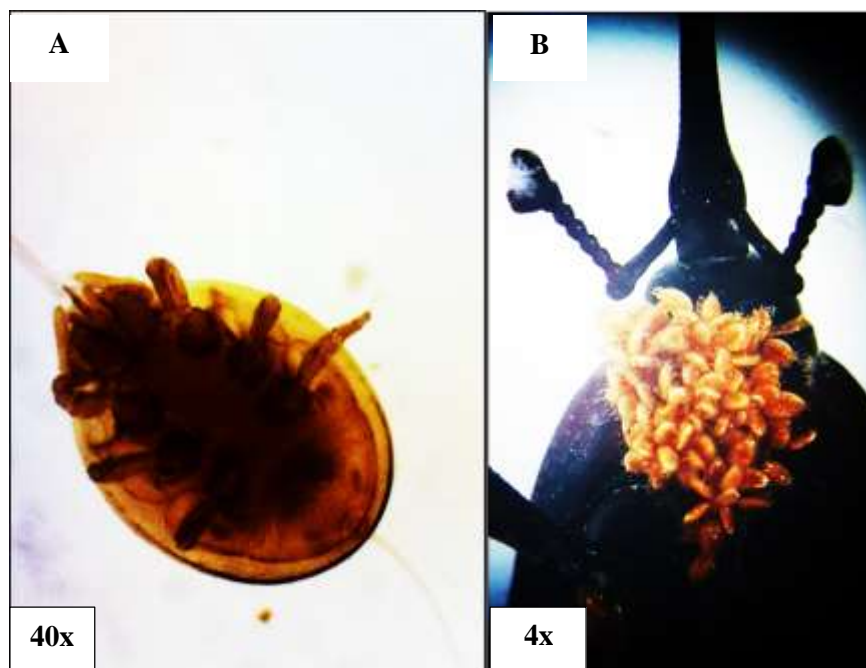


Figure 3. A. Deutonymph of genus *Uroobovella*, B. Thorax of red palm weevil with phoretic mite.



Figure 4. Symptoms of infestation by red palm weevil.

4. Conclusions

Several species of mites have a stable or occasional symbiotic relationship with insects of various orders. Members of several mite families attack coleopteran insects. Several studies should be done on this subject to determine if this mite can be used in biological control programs to control the red palm weevil.

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Conflict of Interest

There are no conflicts of interest.

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