

First record of *Aceria guerreronis* Keifer, 1965 (Acari: Eriophyidae) in PanamaPrimer registro de *Aceria guerreronis* Keifer, 1965 (Acari: Eriophyidae) en PanamáSantos Díaz-Martínez¹  and Harol Revelo-Tobar^{1*} ¹Instituto de Fitosanidad "Entomología y Acarología", Colegio de Postgraduados, Campus Montecillo, Texcoco, Estado de México, México. ✉ hrevelo@earth.ac.cr*

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Abstract. *Aceria guerreronis* or coconut mite, has been documented for the first time in the Republic of Panama. The species was detected in the Cinta Costanera in Panama City, where *Cocos nucifera* fruits exhibited the characteristic symptoms of the pest. This report provides a brief morphological description of the species, supplemented with scanning electron microscopy images. It is expected that this communication will serve as a valuable tool for timely sampling, assessment of the phytosanitary risk posed by this species, and, if necessary, the implementation of phytosanitary measures to manage it.

Key words: Central America; *Cocos nucifera*; mite; phytosanitary surveillance.

Resumen. *Aceria guerreronis* o ácaro del cocotero, ha sido documentada por primera vez en la República de Panamá. La especie fue detectada en la Cinta Costanera de la Ciudad de Panamá, donde los frutos de *Cocos nucifera* presentaban los síntomas característicos de la plaga. Este informe proporciona una breve descripción morfológica de la especie, complementada con imágenes de microscopía electrónica de barrido. Se espera que esta comunicación sirva como una herramienta valiosa para el muestreo oportuno, la evaluación del riesgo fitosanitario que representa esta especie y, de ser necesario, la implementación de medidas fitosanitarias para su manejo.

Palabras clave: Ácaro; Centroamérica; *Cocos nucifera*; vigilancia fitosanitaria.

The eriophyid mite *Aceria guerreronis* was first described by Keifer (1965) from specimens collected in the Guerrero state, Mexico. In the same year, it was reported in Rio de Janeiro, Brazil (Robbs & Peracchi 1965). Navia *et al.* (2005) confirmed its American origin through molecular analysis. *Aceria guerreronis* appearance has an elongated and vermiform, with a yellowish-white coloration. According to Keifer (1965), adult females range in length from 204 to 255 μm and in width from 36 to 52 μm . However, morphometric variations have been observed among populations throughout its distribution areas (Navia *et al.* 2006, 2009). This species has been reported in multiple countries across four continents: America, Africa, Asia and Oceania: Papua New Guinea, throughout the tropical region, as compiled by Navia *et al.* (2013) and Aratchige *et al.* (2016).

The host of this species are restricted to the family Arecaceae, as they have been reported from *Lytocaryum weddellianum* (H. Wendl.) [cited as *Cocos weddelliana* H. Wendl.] in Brazil

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(Flechtmann 1989), *Syagrus romanzoffiana* (Cham.) Glassm. in southern California, USA (Ansaloni & Perring 2002) and *Borassus flabellifer* L. in India (Ramaraju & Rabindra 2002), however, *Cocos nucifera* is the main host species of this mite. *Aceria guerreronis* populations inhabit the meristem of coconut fruit, a whitish circular area known as the perianth which is covered by bracts; this is the area from which the fruit expands during development (Lawson-Balagbo *et al.* 2008; Varadarajan & David 2002). As they feed on the cell contents, they cause physical damage that affects the integrity of the fruit, and as the fruit develops, the damage extends out of the bracts. Initially, the damage caused by the mite appears yellowish and leads necrosis in the exocarp, along with the formation of deep striations (Fig. 1). Affected fruits exhibit distortion and up to a 30% reduction in copra size (Olvera 1986). Severe infestations of *A. guerreronis* can result in complete fruit atrophy and even fruit drop (Fernando *et al.* 2003).



Figure 1. Damage levels to *Cocos nucifera* fruit caused by *Aceria guerreronis*. / **Figura 1.** Niveles de daños en los frutos de *Cocos nucifera* causados por *Aceria guerreronis*.

Coconut production in Panama does not exceed twenty thousand tons of coconut shell per year (FAO 2021), with much of this production being earmarked for local consumption and export, particularly to countries such as Colombia (USAID 2015). However, recent years have seen a push for the industrialization of this fruit (MIDA 2023). The presence of this mite, along with other such as *Raoiella indica* Hirst, 1924 (Beard *et al.* 2018), could pose a threat to coconut production in the country. Therefore, the primary objective of this study is to report the presence of *A. guerreronis* in coconut palms in Panama for the first time.

Material examined. Palm trees situated in the Cinta Costanera of Panama City, Panama (8°58'20.2"N, 79°31'40.3"W), were sampled on July 28, 2023.

Only five fruits exhibited symptoms characteristic of mite presence; their surfaces, bracts, and meristems were thoroughly examined. Mites were carefully extracted using a fine-tipped brush and preserved in 70% alcohol. They were subsequently transferred to the

acarology laboratory of the Colegio de Postgraduados, where they underwent maceration in lactic acid for three days at 40 °C. One sample was prepared in permanent preparations using Keifer's F medium for mounting, while another was prepared for Scanning Electron Microscopy (SEM). The remaining material was preserved in alcohol with 10% glycerin. Observation of the slides was conducted using a Carl Zeiss Primo Star® phase contrast microscope, with species identification aided by the keys of Keifer (1965), Amrine *et al.* (2003), and the nomenclature of Lindquist (1996) and Navia *et al.* (2009). Measurements were taken using the Gimp 2.10.20 program. Reference specimens were deposited in the acarology collection of the Colegio de Postgraduados, Texcoco, Estado de México, México.

A total of four hundred individuals of *A. guerreronis* were collected, with a sample of 30 females and 11 males examined. Females (Figs. 2A, C) measured $199 \pm 29 \mu\text{m}$ long and $45 \pm 9 \mu\text{m}$ wide, while males (Fig. 2D) measured $136 \pm 2 \mu\text{m}$ long and $31.3 \pm 0.5 \mu\text{m}$ wide. The mean length of females was slightly less than that cited in the literature (Keifer 1965; Howard & Moore 2007; Navia *et al.* 2013).

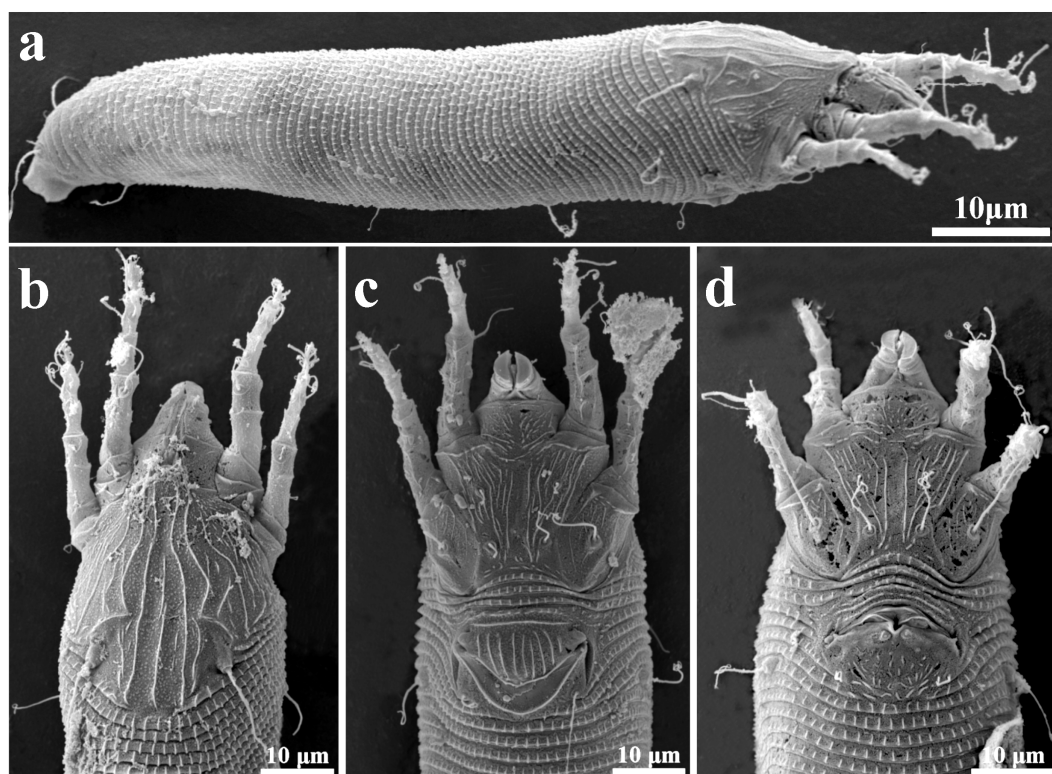


Figure 2. *Aceria guerreronis* Keifer, 1965. **a.** Female complete body, lateral view. **b.** Female prodorsum. **c.** Female genital plate. **d.** Male genital plate. / **Figura 2.** *Aceria guerreronis* Keifer, 1965. **a.** Cuerpo completo de la hembra, vista lateral. **b.** Prodorsum de la hembra. **c.** Placa genital de la hembra. **d.** Placa genital del macho.

The prodorsal shield (*Psh*) exhibited seven longitudinal lines, with a median line approximately 2/3 the length of *Psh*. Two admedian lines traversed the plate completely and converged slightly at the end of the median line. The pair of submedian lines followed a similar trajectory to the admedian lines, curving laterally at 1/3 of the midline and subsequently projecting inward to form a tip; their posterior ends were directed transversely, extending just before the dorsal tubercle. From the tip, two lines departed, terminating at

the posterior end of *Psh*. Two lateral lines had a sigmoid appearance and were shorter in length than the submedian lines (Fig. 2B). The morphology of the prodorsal shield closely resembled that described by Navia *et al.* (2006, 2009). This plate measured 33.5 μm long and 29 μm wide, with dense pitting between the lines and small striations outward from the lateral lines. The gnathosoma exhibited an approximate downward slope of 35°. The anterior leg length measured 31.2 μm , while the posterior legs measured 26.6 μm , both terminating in a plumose empodium with six rays. The space between coxal setae exhibited a *Psh*-like pattern of lines and granulations (Figs. 2C, D). Contrary to the findings reported by Thirumalai-Thevan *et al.* (2004), no mites were found on the surface of the coconut; all individuals were clustered beneath the bracts, feeding on this tissue and the meristem. The preference for remaining within the bracts aligns with the mite's sedentary habits and the necessity to maintain dorsal and ventral contact with a surface. Additionally, the presence of mites on the coconut palm surface, as mentioned by the cited author, could be attributed to changes in the availability of food resources and an increase in population density, prompting the search for new colonization sites. Given the pantropical distribution of the coconut palm and previous reports of the mite in Colombia and Costa Rica, its presence in Panama was anticipated. It is hoped that this study will motivate relevant authorities to develop monitoring programs for this mite, anticipate its impact on national coconut production, and, if necessary, establish phytosanitary management strategies in areas of cultivation and natural distribution of this palm.

Author Contributions

SD: Conceptualization, investigation, writing - original draft. **HR:** Conceptualization, investigation, writing-original draft, writing - review & editing.

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