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Complementary description of *Kuzinellus niloticus* (El-Badry) (Acari, Mesostigmata) from Egypt

Reham Abo-Shnaf a, Sahar Ali Attia b

a Vegetable and Aromatic Plant Mites Department, Plant Protection Research Institute, Agricultural Research Centre, 12611 Dokii, Giza, Egypt.

b Scale Insects and Mealy Bugs Department, Plant Protection Research Institute, Agricultural Research Centre, 12611 Dokii, Giza, Egypt.

**Original research**

**ABSTRACT**

This paper provides a complementary description of *Kuzinellus niloticus* (El-Badry) based on specimens recently collected on mandarin orange orchards, *Citrus reticulata* Blanco (Rutaceae) at Sohag governorate, Egypt. The mite specimens were extracted using modified Tullgren funnels. This predator could have a role as possible biological control agent for some pests on citrus trees.

**Keywords** taxonomy; re-description; morphology; Phytoseiidae; biological control

**Zoobank** http://zoobank.org/07C5E8C0-9B4D-4E8B-AB0B-FA658D5F1445

**Introduction**

The predatory mite family Phytoseiidae is one of the most diverse mite families distributed world-wide with nearly 2,800 described species in 94 genera and three sub-families (Chant and McMurtry 2007; Demite et al. 2021). They mainly prey on spider mites but are also important predators of other mites, small arthropods and nematodes (McMurtry et al. 2013, 2015). Some species are commercially produced for controlling spider mites, thrips and whiteflies. Because many phytoseiids are specialized predators of phytophagous mites they are important agents for biological control.

The genus *Kuzinellus* Wainstein (Typhlodrominae) is known from all continents except Antarctica. *Kuzinellus* includes 53 nominal species so far (Demite et al. 2021). Most of the species have been reported from Africa while others have been collected in southern Russia, India, Pakistan, China, Japan, and the US and recently from Saudi Arabia (Alatawi et al. 2017; Kamran et al. 2017). Up to now, only one species of this genus has been reported from Egypt (El-Badry 1970).

Chant and McMurtry (1994) provided a detailed diagnosis of *Kuzinellus* and separated 27 nominal species in two species groups based on the morphology of most dorsal setae. Moraes et al. (2008) provided description, re-description, and illustrations of 22 species of *Kuzinellus* reported from sub-Saharan Africa along with a diagnostic key of these species, not considering the species groups of this genus made by Chant and McMurtry (1994). Later, two species were added in this genus by El-Banhawy and Knapp (2011).

The genus *Kuzinellus* can be distinguished by the absence of seta *Z1* and the presence of setae *z6* and *JV2*; fixed digit of chelicera with 2–4 teeth and seta *z6* inserted halfway between setae *j6* and *s6* (Wainstein 1976; Chant and McMurtry 1994). In seven species in this genus setae *R1* are placed on the dorsal shield while in the remaining species are located on the unsclerotized cuticle (Chant and McMurtry 1994; Moraes et al. 2008). Chant and Yoshida-Shaul (1986) and Chant and McMurtry (1994) clarified the identity of this seta as *R1* in those species.
In this paper, we re-describe *Kuzinellus niloticus* (El-Badry) based on new specimens collected on citrus orchards at Sohage governorate, Egypt. To date, no other species of the genus has been registered for Egypt.

**Material and Methods**

Mite specimens were collected from leaves of mandarin orange orchards, *Citrus reticulata* Blanco (Rutaceae) at Sohag governorate, Egypt. The samples were kept in polyethylene bags and transferred to the laboratory for later extraction by modified Tullgren funnels (Krantz and Walter 2009). The mites were mounted on microscopic slides in Hoyer’s medium and examined under a phase contrast (Olympus, BHA) research microscope. Taxonomically important structures were illustrated with the aid of an eyepiece attached to the phase contrast microscope, measured with a graded eyepiece. Measurements are given in micrometers. Setal nomenclature follows that of Rowell *et al.* (1978) and Chant and Yoshida-Shaul (1991) for dorsal and ventral surfaces of the idiosoma, respectively. The idiosomal setal pattern follows Chant and Yoshida-Shaul (1992). The notation for solenostomes and poroids is based on Athias-Henriot (1975). Coordinates provided are approximate, as these were not taken at the time the samples were collected.

**Systematics**

*Kuzinellus niloticus* (El-Badry)

*Typhlodromus niloticus* El-Badry, 1967: 464, 1970: 500; Chant & Yoshida-Shaul 1986: 464. *Paraseiulus* (*Hemiseiulus*) *niloticus*, Wainstein 1976: 700. *Seiulus niloticus*, Moraes *et al.* 1986: 231. *Kuzinellus niloticus*, Moraes *et al.* 2004: 273, 2008: 18; Chant & McMurtry 2007: 143; Abo-Shnaf & Moraes 2014: 38.

**Previous records from Egypt**

Cairo governorate (El-Badry 1970).

**Redescription**

**Female** (Two specimens measured, Figs. 1 a–f)

*Gnathosoma* — Corniculi parallel to each other; 18, 17 long, basal width of corniculus 5, 3; distance between tips of corniculi 7, 4. Fixed cheliceral digit 22, 21 long, with three teeth; movable digit 22, 20 long, with one tooth; dorsal and antiaxial lyrifissures are visible (Fig. 1a).

*Dorsum* (Figs. 1b and 1c) — Dorsal shield strongly reticulate; 339, 325 long and 166, 163 wide at s4 level; with 20 pairs of tuberculate setae, twelve pairs of poroids (id1, id2, id4, idx, idl1, idl3, idl4, idm2, idm3, idm4, idm5 and idm6) and five pairs of solenostomes (gd1, gd2, gd5, gd8 and gd9). Length of dorsal setae: j1 25; j3 36, 34; j4 31, 29; j5 29; j6 55, 52; J2 68, 62; J5 13; z2 31, 30; z3 39, 36; z4 35, 36; z5 36, 35; z6 49, 46; Z4 73, 69; Z5 70, 69; s4 47, 43; s6 48, 47; S2 64, 62; S4 68, 66; S5 48, 47; r3 39, 31; R1 47, 44. All setae smooth, except Z4 and Z5, which are serrated. Peritreme extending forward to level of j3.

*Venter* (Fig. 1d) — Anterior region to st1 smooth; sternal shield smooth; with anterolateral corners fused with endopodal plates, with a pair of pores (gst1) on distal end of extension between coxae I-II; posterior margin indistinguishable; with three pairs of setae (st1-st3) and two pairs of poroids (iv1 and iv2). Distances between st1-st1 42, 31; st2-st2 53, 51; st3-st3 83, 73; st4-st4 100, 82; st1-st3 73, 65. Setae st3, st4 and poroid iv3 of each side on unsclerotized cuticle. Genital shield smooth with dense muscle scars and with lateral extensions; distance between st5-st5 60, 57. Ventrianal shield vase-shaped, smooth with a few striae lateral to the...
Figure 1 Kuzinellus niloticus (El-Badry, 1967) adult female. a – Chelicera, b – Dorsal shield, c – Posterior part of idiosoma showing the poroids (idx, idm4, idm5 and idm6) and the solenostomes (gd8 and gd9), d – Ventral shields, e – Spermatheca, f – Gena, tibia and basitarsus of leg IV.
anal opening; 114, 112 long; 66, 62 wide at ZV2 level and 65, 64 wide at level of anus; with four pairs of pre-anal setae and a pair of pre-anal solenostomes (gv3) posteroparaxial to setae JV2. Seta JV5 tuberculate, 57, 53. Ventral setae smooth. With two pairs of filiform metapodal plates.

Spermatheca (Fig. 1e) — Calyx of spermatheca tubular, flaring distally, 13, 10 long; atrium distinct.

Legs (Fig. 1f) — Leg IV with one sharp-tipped macroseta on basitarsus IV: St IV 30, 29; chaetotaxy of genu II: 2, 2/0, 2/1, 1; genu III: 1, 2/1, 2/0, 1.

Specimens examined

Two females from mandarin orange orchards, *Citrus reticulata* Blanco (Rutaceae), collected by the junior author of this paper at Sohag governorate (26°44′38″ N, 32°15′9″ E), Egypt, December 04, 2018. Slides are deposited in the mite reference collection of the Egyptian Society of Acarology Museum (ESAM), Zoology and Agricultural Nematology Department, the Faculty of Agriculture, Cairo University, Giza governorate, Egypt.

Remarks

This species was originally described from the holotype female and one paratype female collected from Khartoum, Sudan. The original description was reasonably detailed, with illustrations and setal measurements. Measurements of the females examined fit those in the original description and the re-description given by Chant and Yoshida-Shaul (1986), except for the longer setae J2, z3, Z4, Z5, s4, S4 and S5, which are about 1.1–1.3 in comparison to those reported in the two above mentioned publications and the shorter j5 and s6 setae (38 and 60 long according to those authors). The dorsal shield bears two pairs of solenostomes (posterolateral j4 and anteriad Z4) according to Chant and Yoshida-Shaul (1986) (five in the examined females in the current work). Peritreme reaching to the level of j1 according to the original description, but to j3 in the examined females in the current work. Fixed cheliceral digit with five teeth in the original description and the re-description given by Chant and Yoshida-Shaul (1986). We found three teeth in the examined females in the current work. Shorter macroseta on St IV (23) according to the original description, instead to 30 and 29 in the examined females in the current work.

Biological investigations under laboratory condition to confirm the ability of feeding of *Kuzinellus niloticus* on some citrus pests would be desirable in order to use the phytoseiid predators in Integrated Pest Management approaches, thus reducing pesticide usage by growers. The importance of systematics in biological control programs is well known. Mite pests and their associated predators must be correctly identified before adequate control measures can be considered.

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