DESCRIPTION OF IMMATURE STAGES AND REDESRIPTION OF ADULTS OF KUZINELLUS KUZINI (WAINSTEIN) FROM WESTERN IRAN

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ABSTRACT: This paper reports the description of immature stages (larva, protonymph and deutonymph) as well as redescriptions of the adults, female and male, of Kuzinellus kuzini (Wainstein, 1962), collected from a walnut infested by the leaf gall mite, Aceria tristriatus (Nalepa), in the Hamedan and Lorestan Provinces, Iran. Furthermore, a key and table to the characteristics of all mobile stages are provided.

KEY WORDS: Phytoseiidae, Kuzinellus, redescriptions, biological control.

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MATERIAL AND METHODS

The specimens were collected from walnut (Juglans regia L.: Juglandaceae) leaves infested with the leaf gall mite, Aceria tristriatus (Nalepa), Eriophyidae, in the Hamedan and Lorestan provinces, Iran. The mites were directly mounted on microscope slides in Hoyer’s medium. The slides were dried in an oven at about 50 °C and examined with Olympus BX51 microscope (Phase Contrast and Differential Interference Contrast). A Lucida apparatus camera was used for the drawings. The classification system used follows that of Chant and McMurtry (2007). Setal nomenclature is that of Rowell et al. (1978) and Chant and Yoshida–Shaul (1991) for dorsal and ventral surfaces of the idiosoma, respectively. Idiosomal setal patterns are those of Chant and Yoshida–Shaul (1992). All measurements are presented in micrometers (μm). Additionally, the key to mobile stages of the species is prepared.

RESULTS

Species: Kuzinellus kuzini (Wainstein, 1962).
Type species: Parasitulius kuzini Wainstein, 1962: 139.

Diagnosis of species: Seta z6 present (in some species only male without z6) and inserted about midway between j6 and s6; seta Z1 absent whereas JV2 and JV3 present or absent. They all have dorsal setal pattern 13A: 8A, with 21 pairs of setae (in female); ventral setal pattern JV:ZV, JV–4:
ZV–1.3 or JV–3.4: ZV–1.3. In this species seta R1 inserted on or out of membranes, external shield with posterior margin indistinct, otherwise setae ST3 usually (but not always) off sternal shield; 2 pairs of metapodal shields; ventrianal shield with 3 or 4 pairs of preanal setae and a pair of preanal pores; peritreme extending anteriorly to level of j1; fixed cheliceral digit with 2–6 teeth, movable cheliceral peritreme extending anteriorly to level of j1; fixed digit with 1–3 teeth; legs I–III without macrosetae; cheliceral digit with 2–6 teeth, movable cheliceral peritreme extending anteriorly to level of R1; fixed j1 usually (but not always) off sternal shield; 2 pairs posterior margin indistinct, otherwise seta inserted on or out of membrans, esternal shield with R1 ZV–1,3 or JV–3,4: ZV–1,3. In this species seta Z5 27–29, 21–22, S5 22–25 and two pairs of lyrifissures. Anal opening surrounded with 3 setae, paranal setae Pa 14–15 and post anal seta PST 16–18 long. Opisthogastric cuticle bearing four pairs of setae, JV4 15–16 and JV5 29–31, ZV1 14–16, ZV3 13–14, long, all smooth, and six pairs of lyrifissures.

Chelicerae (Fig. 3). Chelicerae 115–125 in length; fixed digit with four teeth and 25–27 long, pilus dentilis 6–7 long, movable digit 22–24 long and with two teeth.

Tectum (Fig. 4). The tectum is convex and 31–34 wide.

Spermatheca (Fig. 5). Calyx tubular shape 8–9 long, flaring distally near the vesicul 4 wide.

Peritreme (Fig. 1). Stippled; extending to level of setae j1, 195–202 long.

Legs (Figs. 6–7). Length of legs I–IV (excluding pretarsus): 265–275, 213–220, 215–219, 280–286, respectively. Genu II with 8 setae (Fig. 6). Basitarusu IV with one sharp-tipped macroseta 18–20 long (Fig. 7). Number of setae femur–genu–tibia I–IV given in Table 1.

Male (Figs. 8–12; n= 6). Idiosoma oval; setal pattern: 12A–8A/JV–4:ZV–3, all setae smooth except Z5 serrate and placed on dorsal shield.


Venter (Fig. 2). Venter of idiosoma with 14 pairs of setae or 29 setae (postanal seta unpaired), sternal shield mostly smooth, with 2 pairs of setae ST1 25–27, ST2 22–25 and two pairs of lyrifissures (iv1–iv3), distance: ST1–ST1 45–48, ST1–ST2 30–33, ST1–ST3 62–65; posterior margin indistinct; setae ST3 set on soft integument and 22–24 in length; setae ST4 23–25 long and each with one of lyrifissures set on small metasternal shields. Genital shield 105–112 long, 52–55 wide at level setae ST5, with one pair setae, ST5 18–20 long and distance between ST5–ST5 47–50. Two pairs of elongate metapodal platelet (38–43 and 13–16 long). Ventrianal shield smooth, pentagonal, anterior margin convex, 103–109 long, 42–45 wide at level of setae ZV2 and 57–62 wide at level of anus. Pre-anal region with four pairs of preanal setae JV1 13–15, JV2 12–14, JV3 12–13, ZV2 12–14 long and with one pair preanal pores; anal opening surrounded with 3 setae, paranal setae Pa 14–15 and post anal seta PST 16–18 long. Opisthogastric cuticle bearing four pairs of setae, JV4 15–16 and JV5 29–31, ZV1 14–16, ZV3 13–14, long, all smooth, and six pairs of lyrifissures.

Chelicerae (Fig. 10). Chelicerae 98–105 long; fixed digit 23–25 long, with four teeth; pilus denti-
Figs. 1–7. *K. kuzini* (Wainstein) (adult female): 1—dorsal view of idiosoma; 2—ventral view of idiosoma; 3—chelicera; 4—tectum; 5—spermatheca; 6—genu II; 7—tarsus IV.

Immature stages and adults of *Kuzinellus kuzini* from Western Iran
Figs. 8–12. *K. kuzini* (Wainstein) (adult male): 8—dorsal view of idiosoma; 9—ventral view of idiosoma; 10—chelicera; 11—tectum; 12—tarsus IV.
Immature stages and adults of *Kuzinellus kuzini* from Western Iran

tilis 4–5 long; movable digit 19–21 long, with one tooth, shaft of spermatadactyl 25–28 long, arched and slightly inflated distally.

Tectum (Fig. 11). The tectum 29–31 wide and convex.

Peritreme (Fig. 8). Stippled; extending to level of setae *j1*, 168–173 long.

Legs (Fig. 12). Length of legs I–IV (excluding pretarsus): 238–245, 194–198, 190–195, 257–265, respectively. Basitarsus IV with one sharp–tipped macroseta 20–22 long (Fig. 12). The number setae femur–genum–tibia I–IV given in Table 1.

**Deutonymph** ♀ (Figs. 13–17; *n*=6). Idiosoma oval. All idiosomal and leg setae smooth, except *Z4* and *Z5* barbed.

Dorsum (Fig. 13). Dorsal shield reticulated, with mediolateral incision, 269–278 long, 125–129 long.

**Protonymph** (Figs. 23–27; *n*=6). Idiosoma oval, all idiosomal and leg setae smooth, except *Z4* and *Z5*, barbed. This stage by characteristics of the opisthogastrian region, without dorsal seta *z6* and smaller size, can be distinguished from female deutonymph.


Chelicera (Fig. 20). Chelicera 88–93 long; fixed digit 20–21 long, with four teeth; *pilus dentilis* 4–5 long; movable digit 17–18 long with one tooth.

Tectum (Fig. 21). The tectum 24–26 wide and convex.

Peritreme (Fig. 18). Extending to level of setae *z2*, 116–120 long.

**Peritreme** (Fig. 18). Extending to level of setae *z2*, 116–120 long.

Legs (Fig. 22). Length of legs I–IV(excluding pretarsus): 222–226, 188–193, 180–185, 232–236, respectively. Basitarsus IV with a knobbed macroseta, 24–25 long (22). Numbers of setae on femora, genua and tibiae I–IV are given in Table 1.

**Protonymph** (Figs. 23–27; *n*=6). Idiosoma oval, all idiosomal and leg setae smooth, except *Z4* and *Z5*, barbed.

Figs. 18–22. *Kuzinellus kuzini* (Wainstein) (deutonymph male): 18—dorsal view of idiosoma; 19—ventral view of idiosoma; 20—chelicera; 21—tectum; 22—tarsus IV.
S4 22–23, S5 25–28, r3 17–19, R1 20–23. Between podonotal and opisthonotal shields with several pairs of small, irregular plates and lyrifissures also with a pair of solenostome (gd6).

Venter (Fig. 24). Sternal shield smooth, with three pairs of setae (ST1 18–19, ST2 15–16, ST3 13–14) and two pairs of lyrifissures (iv1–iv2). Opisthogastric cuticle with four pairs of smooth setae (JV1–2, JV5, ZV2), four pair of lyrifissures and one pair preanal pores. Anal opening surrounded by 3 setae (P4 and PST). Length of opisthogastric setae: JV1 12–14, JV2 8–9, JV5 16–18, ZV 27–8, P4 10–11, PST 9–11.

Chelicera (Fig. 25). Chelicera 75–80 long; fixed digit 17–18 long, with four teeth; pilus dentilis 2–3 long; movable digit 14–16 long with two teeth.


Immature stages and adults of *Kuzinellus kuzini* from Western Iran
Tectum (Fig. 26). The tectum 18–21 wide and convex.

Peritreme (Fig. 23). Short and extending to level between setae R1–s6, 26–29 long.

Legs (Fig. 27). Length of legs I–IV (excluding pretarsus): 193–197, 157–170, 152–160, 195–205, respectively. Basitarsus IV with a knobbed macroseta, 26–28 long (27). Numbers of setae on femur, genua and tibiae I–IV are given in Table 1.

**Larva** (Figs. 28–31; n=5). Idiosomal oval, all idiosomal and leg setae smooth.

Dorsum (Fig. 28). Separate podonotal and opisthonal shields, both smooth; podonotal shield 90–94 long and 115–120 wide at level of setae s4, with nine pairs of setae (j1, j3, j4, j5, j6, z2, z4, z5, s4) and three pairs of lyrifissures; opisthonal shield 32–38 long, 115–124 widest level of solenostome gd6, with a pair of setae (Z4) and three pairs of lyrifissures; with length of setae: j1 20–22, j3 13–14, j4 8–10, j5 7–8, j6 37–40, z2 11–13, z4 15–17, z5 9–10, Z4 70–74, s4 32–34. Setae s4, j6 and Z4 longer rather other dorsum setae and s4 knobbed distally. Cuticle between podonotal and opisthonal shields with transvers striation with a pair of solenostome (gd6) and one pair lyrifissure.

Venter (Fig. 29). Sternal shield smooth, and with three pairs of setae of subequal lengths (ST1 15–17, ST2 13–15, ST3 14–15). Opisthogastric cuticle with four pairs of smooth setae (JV1–2, JV3, ZV2) and three pairs of lyrifissures. Length of opisthogastric setae: JV1 6–7, JV2 17–19, JV3 5, ZV2 6–7, PA 20–22, PST 19–20.

Tectum (Fig. 30). The tectum 15–17 wide and convex (Fig. 3).

Chelicera (Fig. 31). Chelicera 60–65 long; fixed digit 12–13 long, with two teeth; pilus dentilis 2 long; movable digit 10–11 long with one tooth.

Peritreme. Absent.

Legs. Length of legs I–III (excluding pretarsus): 185–190, 140–146 and 151–155, respectively. Numbers of setae on femur, genu and tibia I–III are given in Table 1.

**DISCUSSION**

In this study, the morphology and measurements of idiosomal setae in mobile stages of *K. kuzini* are presented. Chaetotaxy of idiosoma and chelicerae in adults (female and male) closely resemble the original description by Wainstein (1962).

Redescription of females of the Iranian specimens resembles that of Gupta (2003) in having same size in idiosomal setae, but it differs by leg IV with a macroseta on basitarsus and genu II with 8 setae opposed to leg IV without a macroseta, and genu II with 7 setae as in Gupta’s redescription (Gupta 2003).

**Key to mobile stages of Kuzinellus kuzini**

(Wainstein, 1962)

1. Idiosoma with 3 pairs of legs .............. Larva
   — Idiosoma with 4 pairs of legs .......... 2
2. Dorsal shield divided, Ge II with 6 setae .......... Protonymph
   — Dorsal shield entire, Genu II with 8 .......... 3
3. Dorsal shield with mediolateral incision .......... 4
   — Dorsal shield without mediolateral incision ... Adult

4. Opisthogasteral cuticle with 8 pairs of setae, seta z6 present ........................ Deutonymph
   — Opisthogasteral cuticle with 6 pairs of setae, seta z6 absent ..................... 5
5. Movable digit of chelicera without spermadactyl, seta z6 present ..................... Female
   — Movable digit of chelicera with spermadactyl, seta z6 absent ..................... Male

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**REFERENCES**


Immature stages and adults of *Kuzinellus kuzini* from Western Iran


**Table 1**

Comparison of characters of all stages of *Kuzinellus kuzini* (Wainstein, 1962)

<table>
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Note: **L.**—larva, **P.**—protonymph, **D.**—deutonymph, **A.**—adult, *—numbers of setae.