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Article

Aceria sadeghii sp. nov. (Acari: Eriophyidae) from Northeast Iran

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ABSTRACT
A new gall-forming Aceriini mite, *Aceria sadeghii* **sp. nov.**, was discovered and described in the Razavi Khorasan Province of Iran. It caused distortion on the upper side of the leaves without hypertrichosis on leaves of *Krascheninnikovia ceratoides* (L.) Güldenstädt (Amaranthaceae). This is the second eriophyoid species found on this host plant genus.

KEYWORDS: Amaranthaceae, distortion, Eriophyinae, fauna, *Krascheninnikovia*.

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INTRODUCTION

Krascheninnikovia Güldenstädt is a small genus of perennial herbs in the Amaranthaceae family, comprising three species in the world (POWO 2023). *Krascheninnikovia ceratoides* (L.) Güldenstädt (Pamirian Winterfat) is a perennial shrub and grows in shortgrass steppes, desert steppes and semi-deserts of the temperate Holarctic region, reaching into the subtropical region across the Northern Hemisphere. It is mainly found in the Irano-Turanian floristic region, but its range goes much further (Seidl *et al*. 2020).

Up to now, approximately 31 eriophyoid mite species (Acari: Eriophyoidea) have been reported on Amaranthaceae plants around the world (Amrine and de Lillo unpublished databases). Out of these species, twenty-two belong to the genus *Aceria* (Lewandowski *et al*. 2021). According to Tajaddod *et al*. (2018), five eriophyoid mite species on Amaranthaceae plants have been recorded in Iran and all of them belong to the genus *Aceria*. Since then, *Aceria halothamni* Honarmand *et al*., 2020 on *Halothamnus auriculus* (Moq.) Botsch. (Amaranthaceae) was added to the list of eriophyoid mites on Amaranthaceae plants from Iran. *Aceria zumetae* Boczek & Petanovic, 1994 is the only eriophyoid mite species on *Krascheninnikovia* genus that causes small galls on the leaves of *K. ceratoides* in Spain.

A field survey was conducted in the northeast of Iran (Razavi Khorasan Province) in the summer of 2023 to augment our comprehension of the eriophyoid mites in the unexplored regions of the country.

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MATERIAL AND METHODS

The plant materials were collected from northeast Iran (Razavi Khorasan) in the summer of 2023. Mite specimens were recovered directly by a needle from deformed parts of the leaves under a stereomicroscope and transferred to ethanol alcohol (70%) as the preservative medium (Walter and Krantz 2009). The mites were heated in lactic acid at 70 °C for 5 minutes (modified methods) and slides were prepared using Heinze PVA (polyvinylalcohol) medium (Evans 1992). Morphological measurements were performed based on Amrine and Manson (1996), modified by de Lillo *et al*. (2010) through an Olympus BX53 phase contrast microscope. In the female description, the holotype measurements are followed by range values of the studied population (i.e. holotype and paratypes) set between parentheses; only the range values are given for males. The mean values of the paratypes are reported in a few cases when measurements of the holotype could not be taken, due to the slide mounting position of the specimens; these are marked by an asterisk (*). The line drawings were made with a camera lucida, following the method of de Lillo *et al*. (2010), and the abbreviations followed the ones from Amrine *et al*. (2003). Adobe Photoshop® CC 2017 software was used for drawings' editing. Amrine *et al*. (2003) was followed for abbreviations labeling schematic drawings in figures. Host plant was identified by Mohammad Reza Joharchi, botanist at the Plant Science Research Institute, Ferdowsi University of Mashhad, Iran; names and their synonymies are in accordance with "*The World Flora Online*" (2023).

Type materials are deposited at the Acarology Laboratory, Department of Plant Protection, Faculty of Agriculture, Azarbaijan Shahid Madani University, Tabriz, Iran, except one paratype which is deposited in the Acarological Collection, Jalal Afshar Zoological Museum (JAZM), Faculty of Agriculture, University of Tehran, Karaj, Iran.

RESULTS

Family Eriophyidae Nalepa
Subfamily Eriophyinae Nalepa
Tribe Aceriini Amrine & Stasny
Genus *Aceria* Keifer

Aceria sadeghii sp. nov. (Fig. 1)

http://zoobank.org/urn:lsid:zoobank.org: act:3C3162B3-74D4-43C0-A5BF-E868D7CE222B

Description

FEMALE (number of measured specimens = 10) – Body vermiform, 290 (240–290, including gnathosoma), 50 (50–55) wide, 53* (50–55) thick. **Gnathosoma** 20 (17–21) projecting obliquely downwards, pedipalp coxal setae *ep* 3 (no range), dorsal pedipalp genual setae *d* 6 (6–7), unbranched, palp tarsus setae *v* 1 (no variation), cheliceral stylets 18 (16–18). **Prodorsal shield** subtriangular 26 (26–28), including frontal lobe, 30 (26–30) wide; with rounded frontal lobe 4 (3–4) over gnathosomal base. Shield pattern composed of faint bumplike admedian lines; median and submedian lines absent. Some strong dashes present on lateral sides of prodorsal shield, and some granules between prodorsal shield and coxa region. Tubercles of scapular setae *sc* on rear shield margin, 15 (14–16) apart, scapular setae *sc* 21 (19–22), directed backward. **Leg I** 32 (29–32), femur 9 (8–9), genu 5 (4–5), tibia 5 (5–6), tarsus 8 (8–9), tarsal solenidion *ω* 9 (9–10), curved down, distally slightly knobbed, empodium 5 (no range), simple, 5-rayed; basiventral femoral setae *bv* 12 (11–14), antaxial genual setae *l″* 25 (24–26), paraxial tibial setae *l′* 7 (6–8), paraxial fastigial tarsal setae *ft′* 14 (12–15), antaxial fastigial tarsal setae *ft″* 28 (24–28), paraxial unguinal tarsal setae *u′* 3 (3–4). **Leg II** 28 (26–28), femur 7 (7–9), genu 4 (4–5), tibia 4 (3–4), tarsus 8 (7–8), solenidion *ω* 9 (9–11), curved down, distally slightly knobbed, empodium 5 (no range), simple, 5-rayed; femoral setae *bv* 14 (13–15), genual setae

l″ 11 (9–12), tarsal setae *ft′* 6 (6–7), setae *ft″* 28 (27–29), setae *u′* 3 (no range). **Coxae I** ornamented with some strong dashes and coxae **II** with few microtubercles; setae *1b* 10 (8–10), tubercles *1b* 9 (8–9) apart, setae *1a* 26 (24–26), tubercles *1a* 6 (6–7) apart, setae *2a* 43 (39–46), tubercles *2a* 18 (18–20) apart, prosternal apodeme 3 (2–3). **Opisthosoma** dorsally arched with 91 (79–91) dorsal semiannuli, with elliptical microtubercles close to the rear margin, and 72 (70–76) ventral semiannuli, with elliptical microtubercles; 5 (5–6) semiannuli with fine microtubercles between coxae and genital coverflap; last 7 (6–7) ventral semiannuli of the opisthosoma with elongated microtubercles on the ventral side. Setae *c2* 31 (28–31), on ventral semiannulus 9 (8–10); setae *d* 65 (58–67), on ventral semiannulus 23 (20–23); setae *e* 10 (8–11), on ventral semiannulus 37 (36–40); setae *f* 22 (20–23), on ventral semiannulus 64 (63–68), 8 (7–8) annuli after setae *f*. Setae *h2* 120 (105–130), setae *h1* 6 (5–6). **External genitalia** 13 (12–14), 21 (19–21) wide, coverflap with 9 (8–10) longitudinal striae, setae *3a* 20 (18–22), 15 (13–15) apart; with two transversal rows of granulated lines at the genital coverflap base that interrupted at middle. **Internal genitalia** with anterior, trapezoidal transversal apodeme, spermathecae ovoid and oriented posterolaterad; longitudinal bridge relatively long as long as five times of spermathecae length and spermathecal tubes short.

MALE (number of measured specimen = 1) – Body vermiform, 230 (including gnathosoma), 48 wide. **Gnathosoma** 14 projecting obliquely downwards, chelicerae 14, palp coxal setae *ep* 3, palp genual setae *d* 6, unbranched, palp tarsus setae *v* 1. **Prodorsal shield** 28, including frontal lobe, 27 wide, frontal lobe 2. Shield pattern similar to that of female. Tubercles of scapular setae *sc* on rear shield margin, 15 apart, setae *sc* 19. **Leg I** 30, femur 8, genu 4, tibia 5, tarsus 8, solenidion *ω* 9, curved down, distally slightly knobbed, empodium 4, simple, 5-rayed; femoral setae *bv* 12, genual setae *l″* 23, tibial setae *l′* 6, tarsal setae *ft′* 12, setae *ft″* 23, paraxial unguinal tarsal setae *u′* 3. **Leg II** 26, femur 7, genu 4, tibia 4, tarsus 7, solenidion *ω* 11, curved down, distally slightly knobbed, empodium 5, simple, 5-rayed; femoral setae *bv* 11, genual setae *l″* 10, tarsal setae *ft′* 6, setae *ft″* 27, paraxial unguinal tarsal setae *u′* 3. **Coxae** similar to those of female; setae *1b* 10, tubercles *1b* 9 apart, setae *1a* 19, tubercles *1a* 6 apart, setae *2a* 35, tubercles *2a* 18 apart. Prosternal apodeme 3. **Opisthosoma** dorsally arched with 74 dorsal semiannuli; 68 ventral semiannuli; 6 semiannuli between coxae and genital region. Setae *c2* 28 on ventral semiannulus 9, setae *d* 56 on ventral semiannulus 19; setae *e* 8 on ventral semiannulus 33; setae *f* 20 on ventral semiannulus 59, 7 annuli after setae *f*. Setae *h2* 80; setae *h1* 4; setae *3a* 18, 10 apart.

Type host plant

Krascheninnikovia ceratoides (L.) Güldenstädt (Amaranthaceae), Pamirian Winterfat.

Relation to the host plant

Leaf galls consisting of distortions but with normal trichome density (Fig 2.)

Type locality

Borselan village, in the central district of Quchan County, Razavi Khorasan Province, northeast Iran, (36° 56' 43.2" N, 58° 24' 18.7" E), 2124 m above sea level, coll. A. Honarmand, 24 June 2023.

Type material

Holotype: female, on a microscope slide (slide code: AH02–N_{10}); paratypes: 9 females (specimen's codes: AH02–N_1 in single slide, AH02–N_2 in single slide, AH02–N_3 and AH02–N_4 in single slide; AH02–N_5 in single slide, AH02–N_6 and AH02–N_7 in single slide; AH02–N_8 and AH02–N_9 in single slide and;) and one male (slide code: AH02–N_M) mounted on separate microscope slides (AH02–N_1 and AH02–N_M in a single slide).

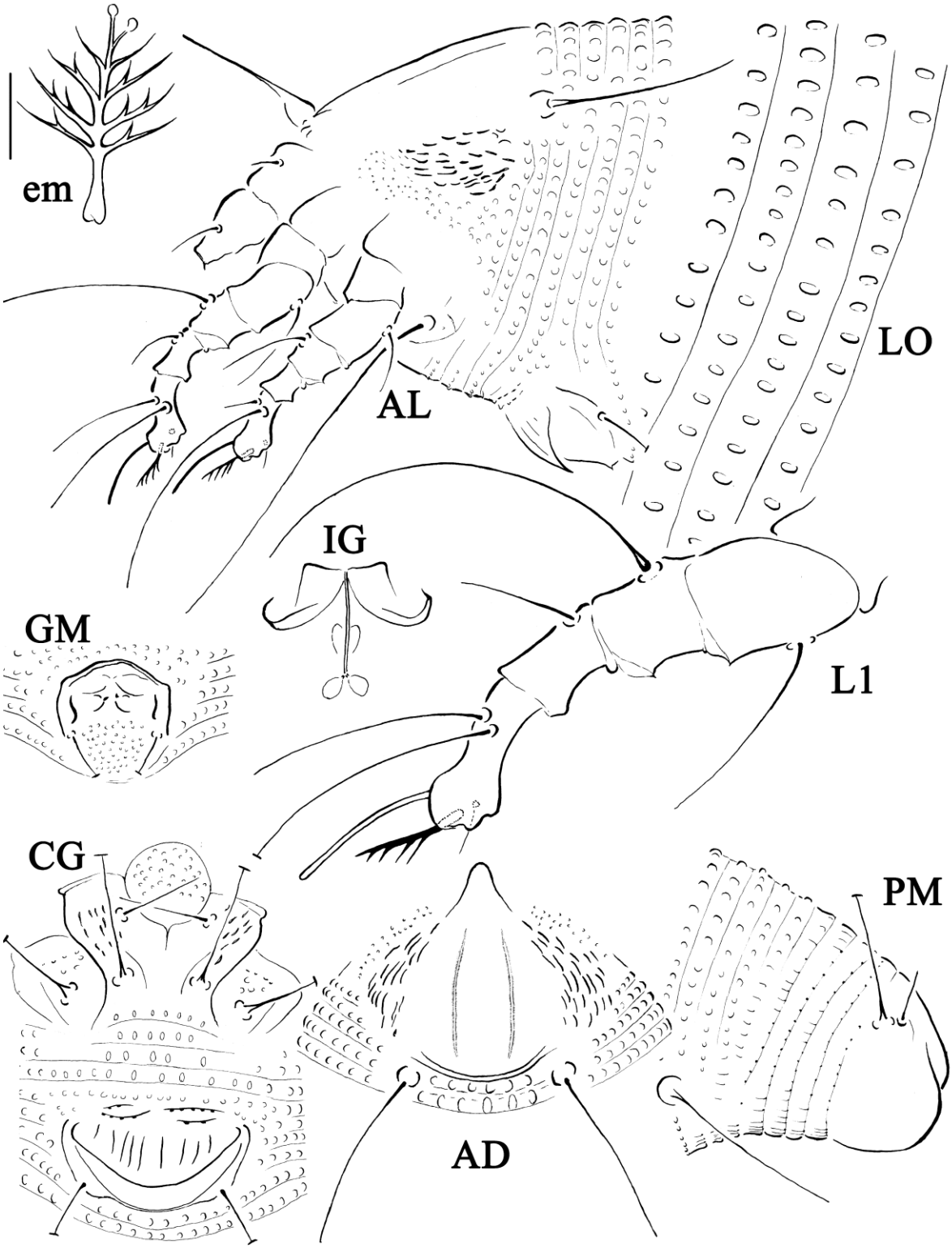

Figure 1. Line drawings of *Aceria sadeghii* **sp. nov.** – **AD.** Prodorsal shield; **AL.** Lateral view of anterior body region; **CG.** Female coxigenital region; **em.** Empodium; **GM.** Male genital region; **IG.** Internal female genitalia; **LO.** Lateral view of annuli; **L1.** Leg I; **PM.** Lateral view of posterior opisthosoma. **Scale bar:** 10 μm for AD, AL, CG, IG, PM; 5 μm for LO, L1; 2.5 μm for em.

Figure 2. Leaves' distortions of *Krascheninnikovia ceratoides* (L.) Güldenstädt by *Aceria sadeghii* **sp. nov.** Scale bar: 10 mm.

Other material

Mites extracted from the same sample as the type specimens were preserved in part in 70% ethanol (Walter & Krantz 2009) (tube code: AH02–N).

Etymology

The new species is named in honor of Hussein Sadeghi Namaghi, professor at the Ferdowsi University of Mashhad, for his dedication to the Acarology and Entomology of Iran.

Differential diagnosis

Aceria sadeghii **sp. nov.** is similar to *Aceria zumetae* Boczek & Petanovic, 1994 as the only other eriophyoid mite on *Krascheninnikovia ceratoides* (L.) Güldenstädt (Amaranthaceae), that caused small galls on plant leaves in Spain. Prodorsal shield pattern in *Aceria zumetae* composed median, admedian and submedian lines whereas in the new species median and submedian lines are absent; scapular setae *sc* 21 (19–22) in *Aceria sadeghii* **sp. nov.** and 45 in *A. zumetae*. The new species has 79–91 dorsal semiannuli and 8–10 longitudinal striae on genitalia coverflap, while *Aceria zumetae* has 70–82 dorsal semiannuli and 12–14 longitudinal striae on the coverflap. Compared with other *Aceria* species associated with Amaranthaceae plants, the new species appears to be close to *Aceria vanensis* Kiedrowicz, Denizhan, Bomberek, Szydlo & Skoracka, 2016, which was originally found

as vagrant mite on *Amaranthus retroflexus* L. (redroot amaranth) from Turkiye. Prodorsal shield in both species composed of only incomplete admedian lines, but in *Aceria sadeghii* **sp. nov.** are twice as long as *A. vanensis*; prodorsal shield in *A. sadeghii* **sp. nov.** has rounded frontal lobe 4 (3–4), whereas it lacks frontal lobe in *A. vanensis*. Furthermore, they exhibit other resemblances that include shape of internal genital, setae *3a* length (20 (18–22) in *A. sadeghii* **sp. nov.** and 21 (21–25) in *A. vanensis*) and setae *d* 65 (58–67) in *A. sadeghii* **sp. nov.** and 63 (58–70) in *A. vanensis*). The new species is distinguishable by scapular setae *sc* (21 (19–22) in *A. sadeghii* **sp. nov.** and 26 (26–35) in *A. vanensis*), setae *e* (10 (8–11) in *A. sadeghi* **sp. nov.** and 45 (45–55) in *A. vanensis*), *f* (22 (20–23) in *A. sadeghii* **sp. nov.** and 30 (25–48), empodium ray's number (5 in *A. sadeghii* **sp. nov.** and 6 in *A. vanensis*), and genital coverflap ornamention [9 (8–10) longitudinal striae in *A. sadeghii* **sp. nov.** *versus* smooth in *A. vanensis*].

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گونهٔ جدید *Aceria sadeghii* sp. nov. (Acari: Eriophyidae) از شمال شرق ایران

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چکیده

کنهٔ اریوفوئید گالزا ***Aceria sadeghii* sp. nov.**، در استان خراسان رضوی ایران کشف و توصیف می‌شود. این کنه روی برگ‌های گیاه میزبان *Kraschenninnikovia ceratoides* (L.) Güldenstädt (Amaranthaceae) باعث ایجاد گال در سمت رویی برگ‌ها (بدون تراکم زیاد تریکوم یا هیپرتریکوزیس) شد. این دومین گونهٔ اریوفیوئیدی است که در این جنس گیاه میزبان یافت شده است.

واژگان کلیدی: Amaranthaceae، گالزا، Eriophyinae، فون، *Kraschenninnikovia*.

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