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Article

An *Aceria* species (Prostigmata, Eriophyidae) from *Amaranthus* in Brazil

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ABSTRACT

Aceria noxia (Trombidiformes, Eriophyidae), a new species, is described and illustrated from *Amaranthus viridis* (Amaranthaceae), in Brazil.

KEY WORDS: Acari; *Aceria noxia* sp. nov.; *Amaranthus viridis*; Eriophyoidea; female; male.

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INTRODUCTION

Amaranthus viridis L. (Amaranthaceae), a plant native to the Americas (CABI 2020), despite being a unwanted plant in several crops, is used as a medicinal plant and food staple mainly in Northeastern Brazil, where its common name is “caruru” (in Portuguese). A patch of these plants in Piracicaba, São Paulo with leaf chlorotic spots and slight deformation was brought to our attention. A new species of eriophyid mite of the genus *Aceria* was recovered and is herein described and illustrated.

MATERIAL AND METHODS

Infested plants were taken from the Experimental Field of Departamento de Fitopatologia e Nematologia on the Campus “Luiz de Queiroz”, Piracicaba, State of São Paulo, Brazil (Long. 47° 38' 00", Lat. 22° 42' 30"). The mites were recovered in the laboratory from leaves and flowers, under a stereomicroscope and mounted in modified Berlese Medium (Amrine and Manson 1996) on microscope slides. They were kept on a heating plate at circa 60 Celsius for a week, for clarification and drying. The terminology and description used for this mite follows mainly Amrine *et al.* (2003). Examination of the specimens were made by means of a phase-contrast microscope Leitz Dialux 20, at magnification of 1000 (plan-apochromatic lens) in immersion oil. Line drawings were made with the aid of a drawing tube. Measurements, in micrometers, were taken with an ocular grid calibrated with a slide micrometer, and refer to the length of the structures, unless specified otherwise. Measurements of females are of holotype and ranges of paratypes, in parantheses; measurements of

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males are included in the range. Dorsal annuli were counted from the first annulus behind the prodorsal shield rear margin; ventral semi-annuli from the first annulus behind caudal end of genitalia. Slides are deposited in the Mite Reference Collection of Escola Superior de Agricultura “Luiz de Queiroz”, Piracicaba, São Paulo, Brazil, and under no. LZO Zool. 2849. Holotype position is marked on the slide.

Specimens collected on *Amaranthus viridis* were maintained in 70% ethanol for 24 h and processed for scanning electron microscopy (SEM) studies. The specimens were transferred on a drop of ethanol 70% directly to stubs with a double carbon tape, dried at room temperature, sputter coated with gold in a Baltec SDC 050, and examined on a JEOL JSM IT300. Photomicrographs were recorded digitally.

***Aceria noxia* sp.nov. (Figs. 1–6)**

Female ($n = 7$, holotype + 6 paratypes)

Idiosoma – Color while alive light yellowish-white. 224 (160–227), 61 (50–62) wide, vermiform. Rostrum projecting obliquely down, dorsal palp genual (antapical) (*d*) seta 6 (5–6); oral stylets 8 (8–13). Prodorsal shield rounded anteriorly, 31 (28–33), 49 (43–49) wide, without anterior lobe. Median and admedian shield lines complete, slightly sinuose, submedian lines indicated as broken lines of thick elongate granules. Shield laterally beset with irregular, thick and somewhat elongate and more rounded granules. Tubercles of scapular setae (*sc*) are on shield rear margin, 26 (20–26) apart; *sc* setae 18 (18–23).

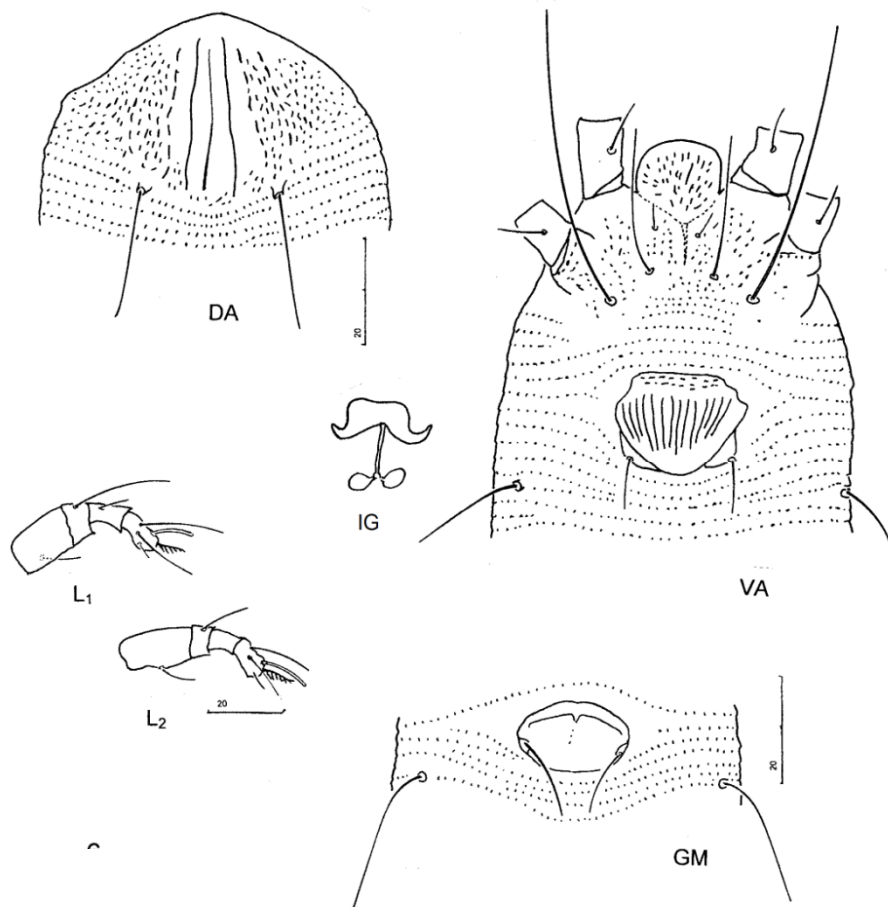


Figure 1. *Aceria noxia* sp. nov. – DA, female dorso-anterior aspect; GM, genital region of male; IG, internal genital structure of female; L₁, leg I of female; L₂, leg 2 of female; VA, ventral-anterior, female.

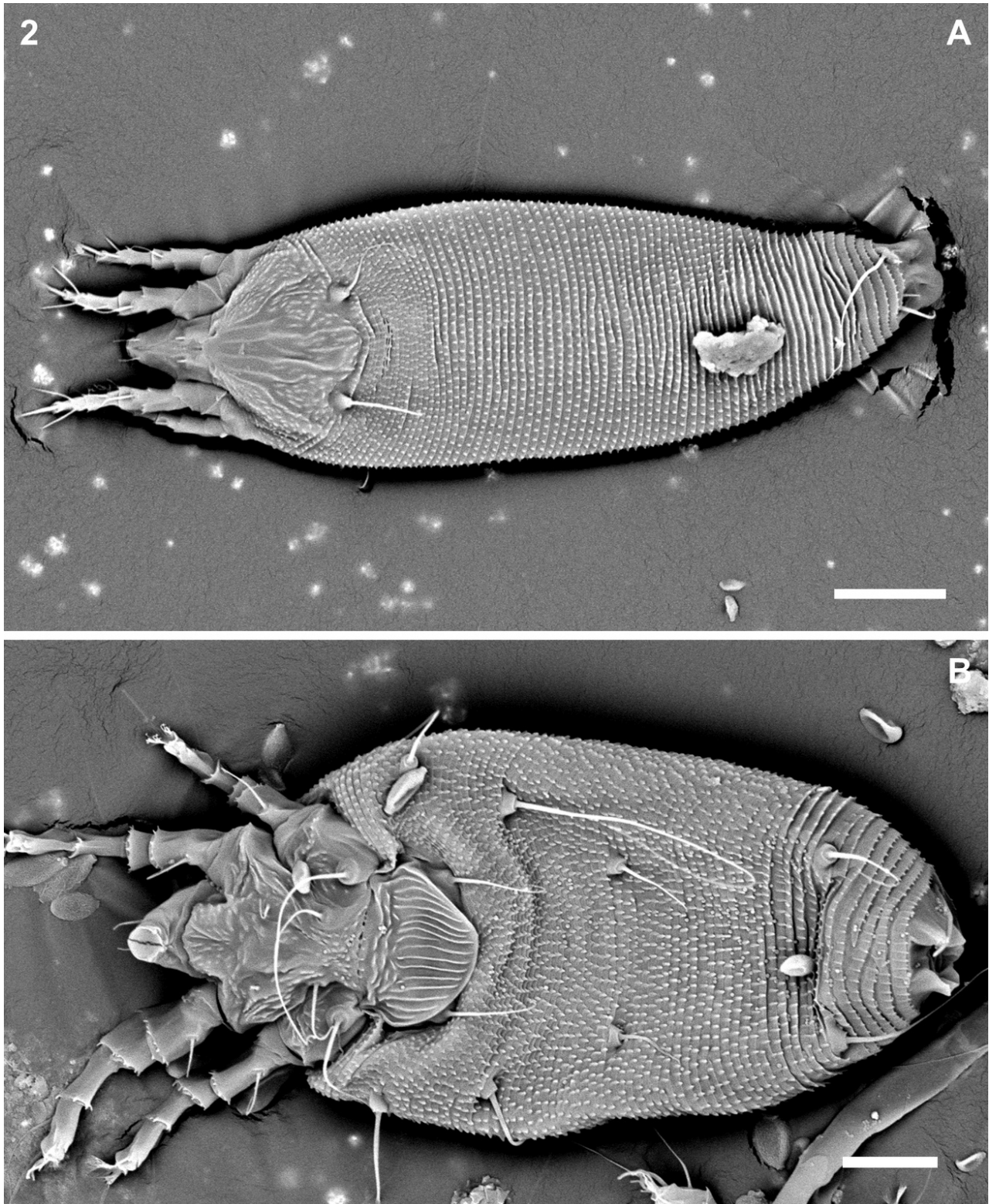


Figure 2. *Aceria noxia* sp. nov. – A. Scanning electron micrograph (SEM) of female, dorsal view; B. SEM of female, ventral view. Scale bars: A = 20 μ m, B = 10 μ m.

Leg I – 38 (40–33); femur 10 (7–10), femoral seta (*bv*) 11 (8–11); genu 4 (4–5), genual seta (*l''*) 25 (18–26); tibia 6 (6), tibial seta (*l'*) 5 (5–8), basal; tarsus 6 (5–6), dorsal seta (*ft'*) 22 (17–23), lateral seta (*ft''*) 15 (11–16), unguinal seta (*u'*) 5 (5), empodium 7 (5–7), solenidion slightly arched, distally blunt, 9 (8–9), empodium 5-rayed.

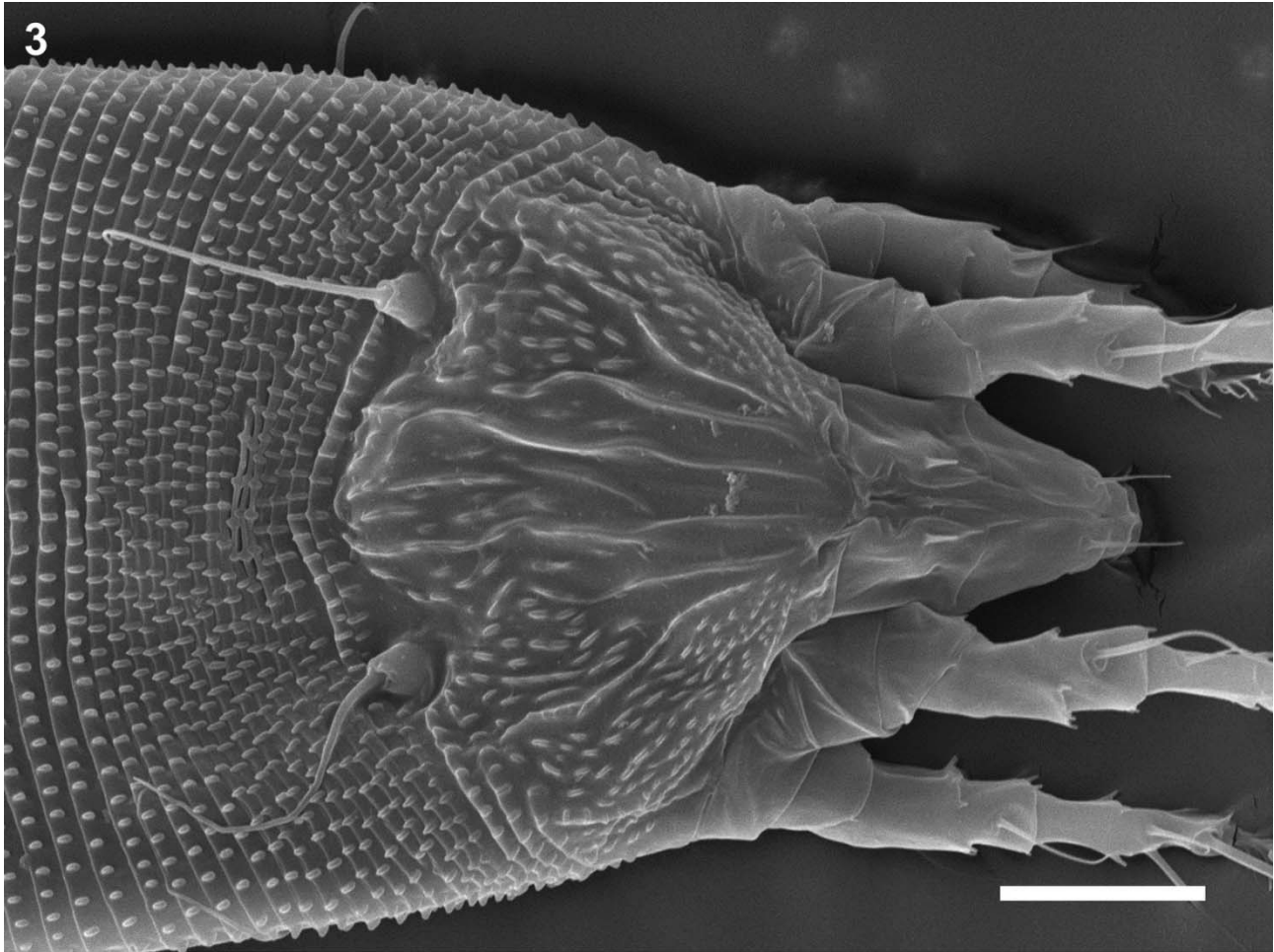


Figure 3. *Aceria noxia* sp. nov. – SEM of prodorsal shield of female. Scale bar 10 μ m.

Leg II – femur 9 (6–9), *bv* 10 (8–10); genu 4 (4), *l''* 11 (8–11), tibia 5 (4–6); tarsus 6 (5–7), *ft'* 23 (19–23), *ft''* 8 (7–8), *u'* 3 (3–4), solenidion 10 (8–10), empodium 6 (7–6), 5-rayed, distally split.

Coxisternal region – Coxae ornamented with coarse granules; coxae I apodemes meet mesally forming an internal apodeme resembling a sternal line (6–9). Fused coxisternal plates extend anteriorly in a cervical plate (suboral plate), with the same sculpture. Coxal seta I (*1b*) 8 (8–10), 9 (9–11) apart; coxal seta II (*1a*) 27 (18–27), 11 (9–11) apart; coxal seta III (*2a*) 40 (40–45), 23 (23–26) apart. Coxigenital annuli 7 (6–7), microtuberculate.

Opisthosoma – Lateral seta (*c2*) 40 (28–40), on annulus 4 (4–6) counting from immediately behind genitalia. Ventral seta I (*d*) 57 (42–58), on annulus 28 (15–28); ventral seta II (*e*) 14 (11–15), 24 (18–24) apart, on annulus 44 (29–44); ventral seta III (*f*) 27 (26–28), on annulus 62 (51–67) or 9th (7th–9th) from rear. Caudal seta (*h2*) 77 (65–77), accessory seta (*h1*) 4 (4). Genitalia 15 (15–18), 21 (21–24) wide, coverflap basally with two transverse bands of coarse granules and distally with 16 (14–16) longitudinal ridges; genital seta (*3a*) 18 (13–18); transverse trapezoidal genital apodeme, spermathecae oval with short tubes. Total dorsal annuli 93 (76–93) from prodorsal rear margin; total ventral annuli 71 (61–76), with beadlike microtubercles except for the annuli caudad of seta *f* with narrow elongate microtubercles.

Male ($n = 3$)

Smaller than female, 150–186, 45–48 wide.

Gnathosoma – Dorsal palp genual seta 4, oral stylets 8–12. Prodorsal shield 26–28, 39–42 wide, *sc* 14–18, scapular tubercles 13–23 apart.

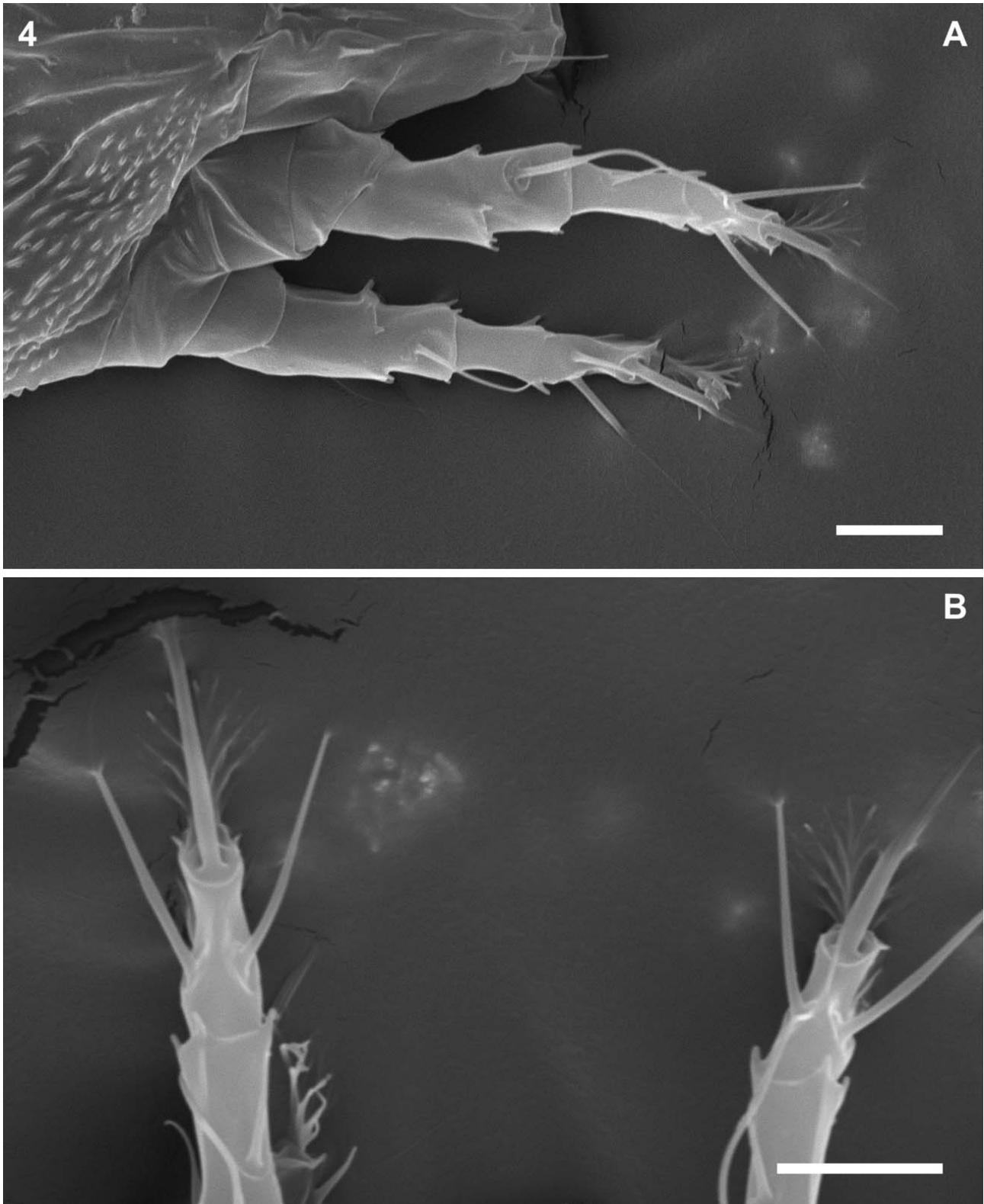


Figure 4. *Aceria noxia* sp. nov. (female) – A. SEM of legs I and II; B. SEM of solenidion and empodium. Scale bars A and B = 5 μ m.

Leg I – 27–30; femur 5–9, *bv* 6–9; genu 4, *l*'' 18–21; tibia 4–5; tarsus 5, *ft*' 18–22, *ft*'' 10–13, *u*' 4, solenidion slightly arched, blunt, 6–7. Empodium 5, 5-rayed. Leg II 25–26; femur 4–6; *bv* 7–10; genu 3–4, *l*'' 8–9; tibia 4; tarsus 4–5, *ft*' 15–18, *ft*'' 4–5, *u*' 3, solenidion 6–7, empodium 4–6, 5-rayed.

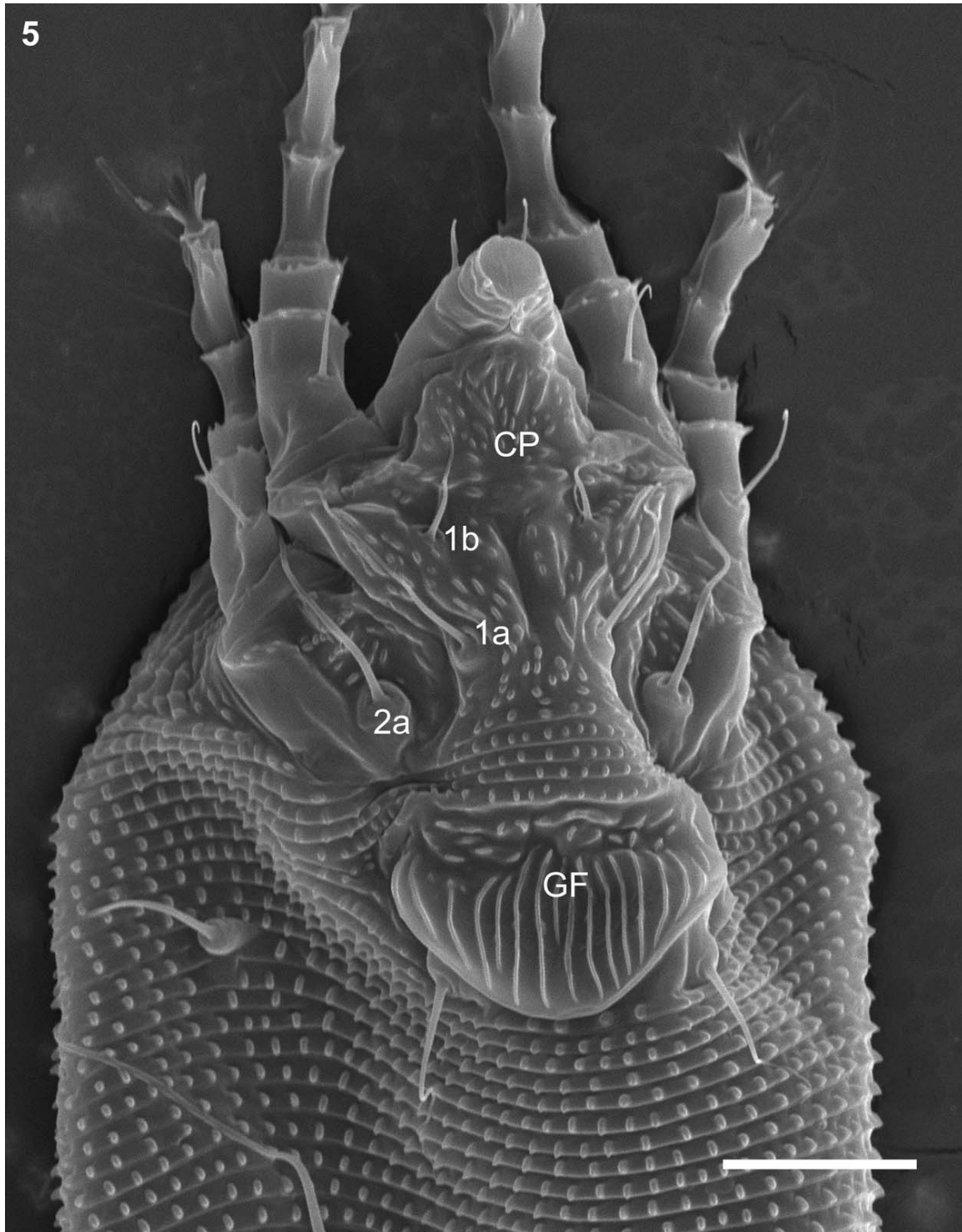


Figure 5. *Aceria noxia* **sp. nov.** (female) – SEM of antero-ventral part; CP, cervical plate; GF, female genitalia; *Ib*, *Ia*, *2a* coxisternal plates setae. Scale bar = 10 μ m.

Coxisternal region – Coxal seta *Ib* 7–10, 9 apart; *Ia* 18–19, 9–10 apart; *2a* 27–35, 19–22 apart; internal apodeme resembling a sternal line, 4–6, coxisternal annuli 5–6.

Opisthosoma – Lateral seta (*c2*) 21–22, on annulus 4; ventral seta *d* 40–49, on annulus 11–13; *e* 9–11, 18–19 apart, on annulus 23–27; *f* 19–23, on annulus 46–53 or 7th–8th from rear. Total ventral annuli 52–60, total dorsal annuli 62–63, microtuberculate as in female. Caudal seta (*h2*) 53–57, accessory seta (*h1*) 4. Genitalia 9–10 long, 17–18 wide, genital seta (*3a*) 10–13.

Type material

Holotype female (its position marked on the microscopic preparation), 28 female and 6 male paratypes, from *Amaranthus viridis* L. (Amaranthaceae), slender amaranth, on 15 microscopic preparations.

Relation to host

The infested host plant leaves exhibited chlorotic patches and slight deformation (Fig. 6).

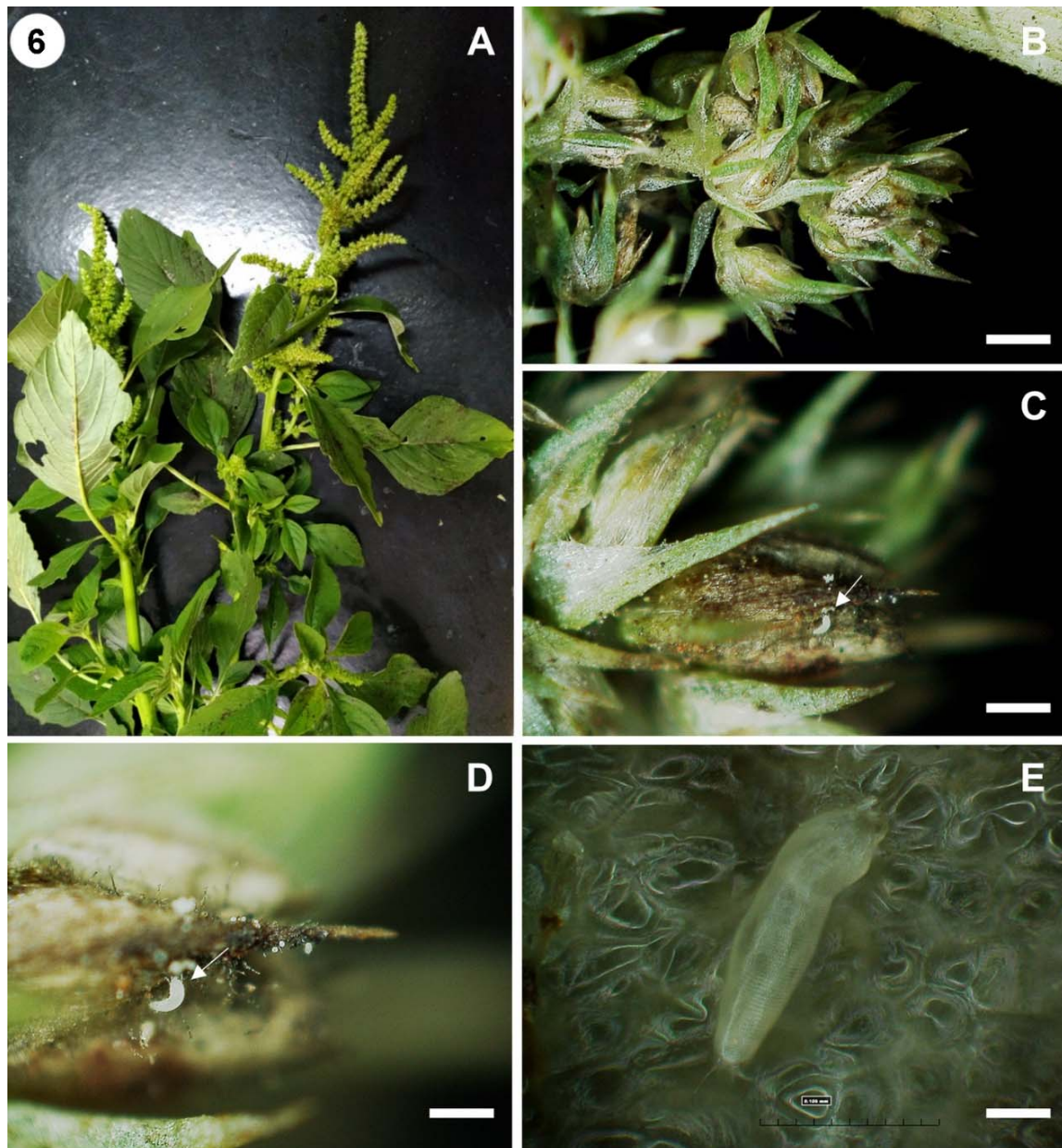


Figure 6. *Amaranthus viridis* – A. Aerial part of plants; B. Part of inflorescence; C. Flower with one *Aceria* specimen; D. Detail of flower with one *Aceria* specimen; E. Close-up of *Aceria noxia*. Scale bars: B = 0.5mm; C = 430 μ m; D = 230 μ m; E = 40 μ m.

Etymology

The specific designation is from the Latin *noxius*, *a*, *um*, meaning harmful and refers to the mite being either directly responsible for the leaf distortion or, perhaps, acting as a virus vector.

Remarks

This is the third species of *Aceria* reported from *Amaranthus* species; Abou-Awad and El-Banhawy (1992) described *Aceria amaranthi* on *Amaranthus* sp. from Tanzania, Africa, infesting both leaf surfaces and causing numerous galls (*A. noxia* **sp. nov.** is vagrant). This species differs in the prodorsal shield ornamentation pattern, not showing dots or granules (which are numerous in *A. noxia* **sp. nov.** prodorsal shield); it also has shorter opisthosomal and caudal setae and no caudal accessory seta (present in *A. noxia* **sp. nov.**). It also differs in the genitalia coverflap, with only 12 longitudinal markings, in contrast with *A. noxia* **sp. nov.** which has 14–16 in the distal part and basally with two transverse bars. This species resembles *A. amaranthi* in 5-rayed empodium and in the beadlike microtubercles on dorsal and ventral annuli. Kiedrowicz *et al.* (2016) described *Aceria vanensis* Denizhan & Kiedrowicz from *Amaranthus retroflexus* L. from Turkey. It was vagrant on leaves but without any apparent indications. The prodorsal shield of *A. vanensis* is smooth and presents only two short submedian lines (whereas *A. noxia* **sp. nov.** is with median, submedian lines and granules); in *A. vanensis* the opisthosomal ventral seta *e* is numerous (45–55, versus 11–15 in *A. noxia* **sp. nov.**) and the coxisternal and cervical plates are smooth while *A. noxia* **sp. nov.** has coarse granules on these regions.

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گونه‌ای از *Aceria* (Prostigmata, Eriophyidae) از روی *Amaranthus* در برزیل

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چکیده

گونه *Aceria noxia* (Trombidiformes, Eriophyidae) گونه‌ای جدید از روی *Amaranthus viridis* (Amaranthaceae) در برزیل توصیف و ترسیم می‌شود.

واژگان کلیدی: زیررده کنه‌ها؛ *Aceria noxia* sp. nov.؛ *Amaranthus viridis*؛ Eriophyoidea؛ ماده؛ نر.

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