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## Article

# A contribution to the knowledge of the eriophyoid mites (Trombidiformes: Eriophyidae) associated to Lythraceae with description of a new species from Iran

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### ABSTRACT

A new eriophyid species (Trombidiformes: Eriophyidae), *Aceria salicariae* Lotfollahi & Tajaddod **sp. nov.**, from the Ajabshir region in southeastern East Azerbaijan Province in Iran, is described and illustrated. A key to all known eriophyoid species collected on the plants of family Lythraceae is presented. Information about their type hosts, type localities and relation to the host plant as well as remarks about available descriptions of these species are provided.

**KEY WORDS:** *Aceria salicariae*; Ajabshir; biological control; female; herbivore; Loosestrife.

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### INTRODUCTION

The family Lythraceae is an angiosperm plant family and includes 31 accepted genus names and about 600 accepted species names, respectively. *Lythrum* is a genus spread throughout the world and is represented by almost 30 accepted species names (The Plant List 2013). Purple loosestrife, *Lythrum salicaria* L., is a well-known medicinal plant from ancient Greek and Roman times. It is used in folk medicine and in pharmaceuticals for treating diarrhea, chronic intestinal catarrh, varicose veins, venous insufficiency, bleeding of the gums, hemorrhoid and eczema (Humadi and Istudor 2009). Purple loosestrife is a noxious or quarantine weed of wetlands in Canada and the USA (USDA, NRCS 2020). It has been listed among the 100 worst invasive alien species of the world owing to its very high adaptability, reproductive fitness, strong competitive ability and extreme sensitivity of wetland habitats (Lowe *et al.* 2004). Its control can be achieved by hand-pulling in low-density populations, but it requires other strategies once the species is established since it generally becomes too abundant as a monoculture. Its chemical control can have serious repercussions for wetland wildlife and fisheries. Cultural techniques (e.g., manipulation of water levels to favor native species) and the enhancement of herbivores associated with it for biological control can be useful and valid alternatives (Mal *et al.* 1992).

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The aim of this paper was to search for potential biological control agents of purple loosestrife in a conservation area like Ajabshir region in Iran. The list and the species key of eriophyoid mites associated to plants of the family Lythraceae are provided in order to offer tools for researchers interested in this topic.

## MATERIAL AND METHODS

In order to survey on eriophyoid mites of Ajabshir region, a preliminary sampling was done on purple loosestrife. Eriophyoid mites were recovered from the plant material by means of a modified washing method developed by Monfreda *et al.* (2007). The mites were slide mounted according to Baker *et al.* (1996) with some changes: specimens were directly placed in modified Hoyer's medium without previous clarification. Specimens were clarified after mounting in slides by incubating at 90 °C for 2–3 minutes. Then, the slides were dried for about four weeks in an oven at 47 °C. The terminology and the setal notation in the morphological description of the mite mainly follow Lindquist (1996) and terminology of the internal female genital apparatus follows Chetverikov (2014) and Chetverikov *et al.* (2014). All morphological measurements were taken by means of a phase-contrast BX53 Olympus microscope, 1000 magnification (oil immersion) according to Amrine and Manson (1996) as modified by de Lillo *et al.* (2010), and are given in micrometers. Slight clarifications should be added as follows: dorsal semiannuli were counted from the first semiannulus behind the rear margin of the prodorsal shield; ventral semiannuli were counted from first complete annulus after coxae II; coxigenital semiannuli were counted medially from the coxal region to the anterior margin of the external genitalia and were not included in the ventral semiannuli count. Measurements and means are rounded off to the nearest integer when required. Measurements refer to the length of the morphological trait unless otherwise specified and are given in micrometers. In the female description, the holotype measurements are followed by range values, in parentheses, of the studied population (*i.e.* holotype and paratypes). The mean values of the paratype traits are reported in the few cases in which the measurements of that trait of the holotype could not be taken, due to the slide mounting position of the specimens and were marked by an asterisk (\*) in the description. Line drawings were hand-drawn through a *camera lucida* according to de Lillo *et al.* (2010) and the abbreviations labelling schematic drawings in figures follow mainly Amrine *et al.* (2003). The genus classification follows Amrine *et al.* (2003) and comparisons were also made with new genera described since that publication. Host plant names and their synonymies are in accordance with "The Plant List, Version 1.1" (2013).

Type materials are deposited at the Acarology Laboratory, Department of Plant Protection, Faculty of Agriculture, Azarbaijan Shahid Madani University, Tabriz (Iran).

### Subfamily Eriophyinae Tribe Aceriini

#### *Aceria salicariae* Lotfollahi & Tajaddod sp. nov. (Fig. 1)

##### *Description*

**FEMALE** (measured specimens  $n = 7$ ) – **Body** vermiform, 167 (167–195, excluding gnathosoma), 54\* (52–55) thick, 52 (50–52) wide. **Gnathosoma** projecting obliquely downwards, chelicerae 19\* (19–20), palp 22\* (21–23), palp coxal setae *ep* 2 (2–3), dorsal palp genual setae *d* 6 (6–8), unbranched. **Prodorsal shield** 25 (25–27) including frontal lobe, 37 (37–40) wide, sub-circular; with a short, flexible distally rounded frontal lobe, 6 (no variation), over gnathosomal base. Shield pattern distinct, consisting of complete median, admedian and inner submedian lines, short

outer submedian lines extended at anterior half of prodorsal shield and many short lines and dashes between submedian lines at the base and on the shield lateral sides. Tubercles of scapular setae *sc* on rear shield margin, 19 (19–22) apart, setae *sc* 47 (43–47), directed posterior divergently. **Legs** with all usual segments and setae. Leg I 41 (40–44), trochanter 6 (5–6), femur 8 (8–10), genu 5 (5–6), tibia 6 (6–8), tarsus 6 (6–10), tarsal solenidion  $\omega$  9 (9–10) distally enlarged and tapered, empodium simple, 6 (6–8), 6-rayed; femoral setae *bv* 13 (13–15), genual setae *l''* 25 (25–30), paraxial tibial setae *l'* 10 (10–11), located in basal 1/3 of tibia, paraxial fastigial tarsal setae *ft'* 21 (19–21), antaxial fastigial tarsal setae *ft''* 38 (28–38), paraxial unguinal tarsal setae *u'* 4 (no variation). Leg II 27 (27–37), trochanter 4 (4–5), femur 7 (7–10), genu 5 (no variation), tibia 6 (6–7), tarsus 7 (7–10), tarsal solenidion  $\omega$  11 (10–11) distally rounded, empodium simple, 7 (7–8), 6-rayed; femoral setae *bv* 12 (12–15), genual setae *l''* 10 (10–14), paraxial fastigial tarsal setae *ft'* 11 (9–11), antaxial fastigial tarsal setae *ft''* 32 (32–33), paraxial unguinal tarsal setae *u'* 5 (no variation). **Coxisternal region.** Prosternal apodeme 6 (5–6), anterior setae on coxisternum I *lb* 5 (5–6), 9 (8–9) apart; proximal setae on coxisternum I *la* 16 (16–27), 7 (7–8) apart; proximal setae on coxisternum II *2a* 45 (45–57), 19 (17–19) apart; 7 (7–8) microtuberculate semiannuli between coxae and genital coverflap plus 1–2 transversal rows of lined granules at the base of the coverflap. Coxae with lined dashes. **External genitalia** 12 (12–13), 22 (20–22) wide, coverflap with 14 (14–17) longitudinal ridges; setae *3a* 20 (20–24), 14 (12–14) apart. **Internal genitalia:** spermathecae ovoid, oriented posterolaterad; spermathecal tubes relatively short; transverse genital apodeme trapezoidal, distally folded. **Opisthosoma** dorsally arched, with 73 (73–86) dorsal semiannuli, 64 (64–90) ventral semiannuli. **Microtubercles:** oval, on posterior part of dorsal semiannuli up to 1/3 of the body; rounded on posterior margin from 1/3 third of the body up to forth semiannuli from the anal lobes; spiny on the rear margin of the last 4 dorsal semiannuli; circular on posterior part of ventral semiannuli, elongated and linear on last 6 ventral semiannuli. Setae *c2* 29 (21–29) on ventral semiannulus 8 (8–12), setae *d* 70 (63–75) on ventral semiannulus 20 (20–31); setae *e* 26 (16–27) on ventral semiannulus 34 (34–54); setae *f* 25 (22–25) on ventral semiannulus 59 (59–84); 5 (5–6) annuli posterior to setae *f*. Setae *h2* 79 (65–105) apically very fine, *h1* 6 (5–7).

**MALE (Fig. 1-GM; measured specimen n = 1)** – Similar in shape and prodorsal shield arrangement to female. Body smaller than female, 129 (excluding gnathosoma), 45 wide; palp genual setae *d* 4; prodorsal shield 25, 32 wide; setae *sc* 40, 18 apart. Opisthosoma with 63 dorsal semiannuli and 65 ventral semiannuli; 5 semiannuli between coxae and genitalia, with microtubercles similar to that of female. Setae: *lb* 10, *la* 20, *2a* 43, *c2* 22, *d* 37, *e* 18, *f* 19, *h1* 5, *h2* 70). Male genitalia 30 wide, setae *3a* 15, 14 apart; empodium 5-rayed.

**NYMPH (measured specimen n = 1)** – Body vermiform, 120 (excluding gnathosoma), 46 thick; palp genual setae *d* 3. Prodorsal shield 34 including frontal lobe. Setae *sc* 22, directed posterior. Opisthosoma with 50 dorsal semiannuli with round microtubercles set on rear margin of semiannuli, 51 ventral semiannuli with oval microtubercles, elongated on the posterior semiannuli. Setae: *lb* 3, *la* 18, *2a* 50, *c2* 19, *d* 35, *e* 16, *f* 22, *h2* 31, *h1* 3. Setae *3a* 12; empodium 5-rayed.

#### *Type host plant*

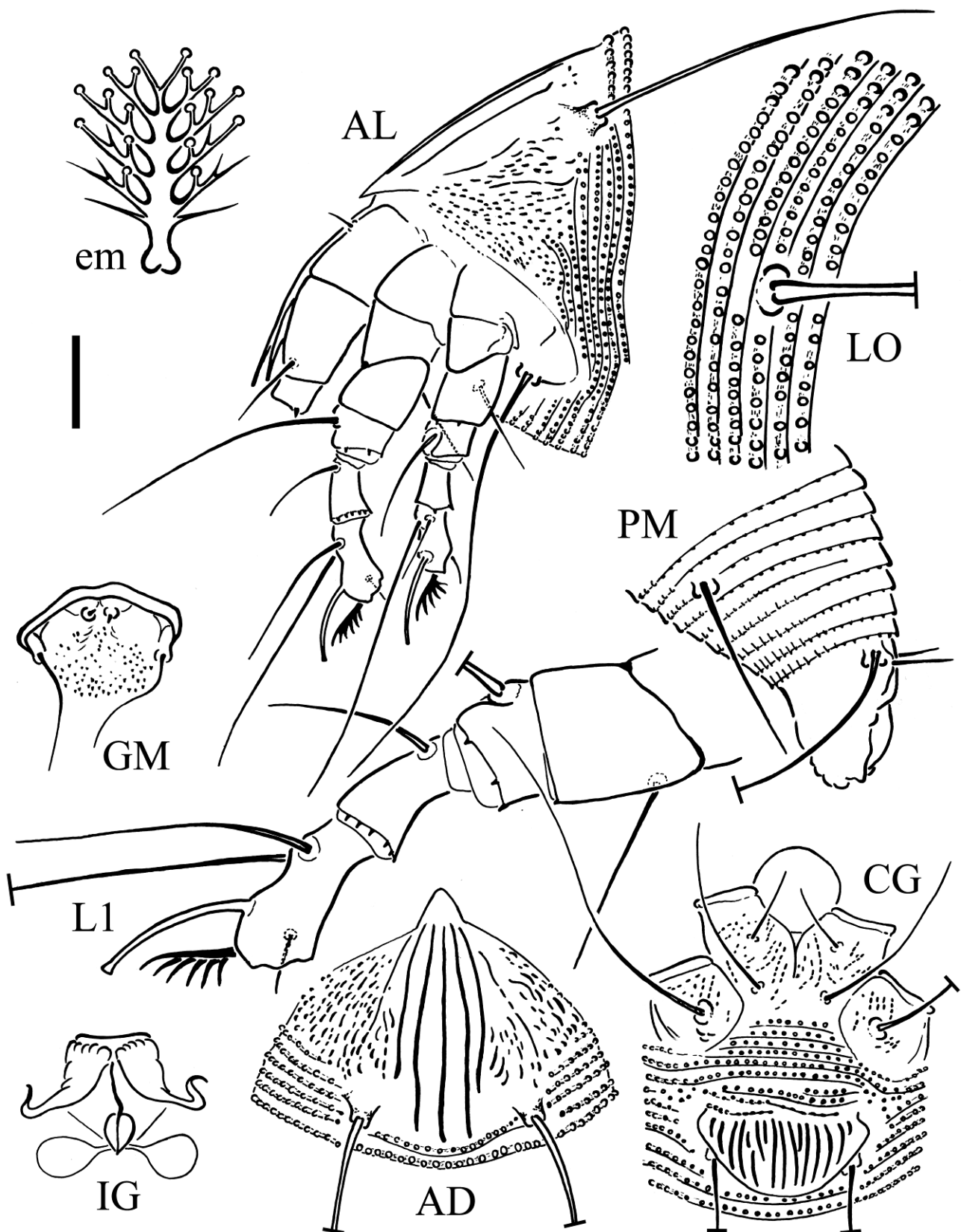
*Lythrum salicaria* L. (Lythraceae), purple loosestrife, purple lythrum, rainbow weed, salicaire, spiked loosestrife, Bouquet-violet.

#### *Type locality*

Sowmaeh village, Ajabshir region, East Azerbaijan Province, Iran (37° 29' 12.9" N, 45° 59' 57.2" E), 1412 m above sea level, coll. S. Tajaddod, early June 2016.

#### *Type material*

Holotype: single female on a microscope slide (LS-IEA-SH16T-1). Paratypes: 6 females, 1 male and 1 nymph mounted singly on separate microscope slides (LS-IEA-SH16T-2-9).



**Figure 1.** Schematic drawings of *Aceria salicariae* Lotfollahi & Tajaddod 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  $\mu$ m for AD, AL, CG, GM, IG, PM; 5  $\mu$ m for LO, L1; 2.5  $\mu$ m for em.

**Table 1.** Gross comparison of some important traits among *A. jovanovici*, *A. granati*, *A. punicae* and *A. salicariae* Lotfollahi & Tajaddod **sp. nov.**

Morphological details	<i>A. jovanovici</i> (Petanović, 1993)	<i>A. granati</i> (Mohanasundaram, 1990)	<i>A. punicae</i> Ranjbar-Varandi, <i>et al.</i> , 2020	<i>A. salicariae</i> Lotfollahi & Tajaddod <b>sp. nov.</b>
Prodorsal shield length	31–35	28	31–37	25–27
Frontal lobe length	Absent	Not available	4–7	6
Number of dorsal semiannuli	69–79	65	65–71	73–86
Number of ventral semiannuli	79	65	52–58	64–90
Number of semiannuli between coxae and coverflap	5 (according to the drawings)	6 (according to the drawings)	10–11	7–8
Rows of lined granules at the base of the coverflap	1 (according to the drawings)	0 (according to the drawings; 5 in Baker <i>et al.</i> 1996)	0	1–2
Number of annuli before the anal lobe	5	5	4	5–6
Number of empodium rays	6	4	4	6
Setae <i>sc</i> length	35	42	28–33	43–47
Tubercles of <i>sc</i> setae distance	20	22	18–23	19–22
Setae <i>1b</i> length	4	Not available	6–10	5–6
Setae <i>1a</i> length	15	Not available	15–24	16–27
Setae <i>2a</i> length	30	Not available	32–43	20–24
Setae <i>c2</i> length	40	25	18–27	21–29
Setae <i>d</i> length	40	45	39–47	63–75
Setae <i>e</i> length	20	8	8–11	16–27
Setae <i>f</i> length	30	22	17–20	22–25
Setae <i>h1</i> length	4	2	4–5	5–7
Genitalia length	14	15	10–15	12–13
Genitalia width	24	20	18–19	20–22
Number of longitudinal striae on genitalia coverflap	14 in two ranks	10–12 (14–16 in Baker <i>et al.</i> 1996)	11–13	14–17
Setae <i>3a</i> length	11	12	10–13	20–24
Setae <i>3a</i> distance	17	Not available	14–16	12–14

#### Other material

Mites preserved in a vial (LS-IEA-SH16T) of Oudemans' fluid (Walter and Krantz 2009) as extracted from the same sample as the type specimens.

#### Relation to the host plant

This new species was vagrant on the host plant and no apparent damage was observed due to the very low density of mites on the host plant.

#### Etymology

The specific epithet is coming from the species name *salicaria* of the type host plant, in the genitive case.



**Table 2.** Eriophyoid mite species collected on Lythraceae worldwide and their type host, type locality and habitus. The list is sorted according to the key sequence.

Species	Type host	Type locality	Habitus
<i>Diptilomiopus lagerstroemae</i>	<i>Lagerstroemia duperreana</i> Pierre ex Gagnep.	Tista Bazar, Darjeeling, West Bengal, India	Mites inhabit in undersurface of leaves causing curling and deformation.
<i>Duabangus chiangmai</i>	<i>Duabanga grandiflora</i> (DC.) Walp.	Amphor Mae Rim, Chiang Mai Province, Thailand	Vagrant on the lower leaf surface.
<i>Diptacus duabangiphagus</i>	<i>Duabanga grandiflora</i> (DC.) Walp.	Meghalaya, India	Vagrant on underface of young leaves.
<i>Cosella speciosae</i>	<i>Lagerstroemia speciosa</i> (L.) Pers.	Tanchou City, Hainan, China	Vagrant on the lower leaf surface. No apparent damage was observed.
<i>Colomerus neopiperis</i>	<i>Lagerstroemia parviflora</i> Roxb.	Northern India	Big bud
<i>Colomerus woodfordis</i>	<i>Woodfordia floribunda</i> Salisb.	Manzabar, Purulia, West Bengal, Northeast India	Bud mite in lateral and terminal buds; causes "crowded buds" and stunting of plants
<i>Calepitrimerus woodfordis</i>	<i>Woodfordia fruticosa</i> (L.) Kurz	Massanjore, Santhalparganas, Bihar, India.	Undersurface leaf vagrant.
<i>Eptrimerus lythri</i>	<i>Lythrum salicaria</i> L.	Carska Bara meadows near Perleska Bara, Serbia.	Leaf rolling, stunting of whole plant.
<i>Aculops longiformis</i>	<i>Punica granatum</i> L.	Najafgarh, Delhi, India	Twisting, yellowing and edge rolling of leaves.
<i>Tegolophus diroutadus</i>	<i>Lagerstroemia subcostata</i> Koehne	Kaohsiung, Tengchih, Taiwan.	Vagrant on the lower leaf surface; no damage reported.
<i>Tegolophus lagerstroemiae</i>	<i>Lagerstroemia speciosa</i> (L.) Pers	Guangxi University, Guangxi Province, P. R. China	Undersurface leaf vagrant
<i>Tegolophus parviflorii</i>	<i>Lagerstroemia parviflora</i> Roxb.	Rong Tong, Darjeeling, West Bengal, India.	The mites are vagrant on lower surface of leaves. No apparent damage symptoms on host plant was observed.
<i>Aceria lagerstroemiae</i>	<i>Lagerstroemia indica</i> L.	Wuzhou, Guangxi (NAU), China.	Erineum
<i>Aceria punicae</i>	<i>Punica granatum</i> L.	Varand village, Sari county, Mazandaran province, Iran.	Vagrant on leaves
<i>Aceria granati</i>	<i>Punica granatum</i> L.	Passignano sul Trasimeno, province of Perugia, Umbria, Italy.	Leaf edge roll.
<i>Aceria jovanovici</i>	<i>Lythrum salicaria</i> L.	Vlasinsko jerezo, Dugi del, Serbia.	Erinea and leaf edge rolling.

### Differential diagnosis

Until now 16 eriophyoid mites have been collected and described from Lythraceae plants (Table 2), including four *Aceria*: *Aceria lagerstroemiae* Kuang & Yang, 1994 from *Lagerstroemia indica* L. in China, *A. granati* (Canestrini & Massalongo, 1894) from *Punica granatum* L. in Italy and several other countries, *A. jovanovici* Petanović, 1993 from *Lythrum salicaria* L. in Serbia and *A. punicae* Ranjbar-Varandi, Haddad Irani-Nejad & Lotfollahi, 2020 from *Punica granatum* L. in Iran. Among them, *A. granati* and *A. punicae* were reported in Iran.

There are many differences between *A. salicariae* Lotfollahi & Tajaddod **sp. nov.** and *A. lagerstroemiae* especially in prodorsal shield pattern. Therefore, *A. salicariae* Lotfollahi &

Tajaddod **sp. nov.** was compared with *A. jovanovici* and *A. granati* (Table 1).

*Aceria salicariae* Lotfollahi & Tajaddod **sp. nov.** shows similarities with *A. jovanovici* in the number of the empodium rays, ornamentation of the female genital coverflap, number of dorsal and ventral semiannuli, length of setae *e* and *f*. Differences regard the length of setae *sc*, *c2*, *d* and *3a*, and number of semiannuli between coxae and genital coverflap (Table 1). Based on the narrative description, the prodorsal shield of *A. jovanovici* is provided with a curved and broken median line, admedian lines on the anterior  $\frac{2}{3}$  of the shield and two pairs of submedian lines on the posterior half of the shield. The prodorsal shield of *A. salicariae* Lotfollahi & Tajaddod **sp. nov.** consists of complete median and admedian lines, whereas the inner pair of submedian lines is on the  $\frac{2}{3}$  of the shield and the outer pair of the submedian lines is extended only on the anterior half. In addition, many short lines and dashes are between the submedian lines at the base and on the shield lateral sides. A short, flexible distally rounded frontal lobe is of the prodorsal shield of *A. salicariae* Lotfollahi & Tajaddod **sp. nov.**, but is lacking in *A. jovanovici*.

Some similarities are observed between *A. salicariae* Lotfollahi & Tajaddod **sp. nov.** and *A. granati* in the length of the prodorsal shield, number of the ventral semiannuli and annuli before the anal lobe, length of setae *sc*, *c2*, and *f*, distance between the tubercles of *sc* setae, length and width as well as ornamentation of the genital coverflap. Differences regard the number of the dorsal semiannuli and of the semiannuli between coxae and coverflap, as well as the presence of rows of lined granules at the base of the coverflap, the number of empodium rays and the length of setae *d*, *e*, *h1* and *3a* (Table 1). In addition, *A. granati* has an anteriorly faint median line which ends with a dart-shaped mark posteriorly (Mohanasundaram 1990; Baker *et al.* 1996), while median line of *A. salicariae* Lotfollahi & Tajaddod **sp. nov.** is distinctly complete and without any further mark.

*Aceria salicariae* Lotfollahi & Tajaddod **sp. nov.** shows similarities with *A. punicae* in the frontal lobe length, tubercles of *sc* setae distance, setae *1b*, *1a*, *c2* and *h1* length, genitalia length and width and setae *3a* distance. They differ in the length of prodorsal shield, setae *sc*, *2a*, *d*, *e*, *f* and *3a* and number of dorsal, ventral semiannuli and semiannuli between coxae and coverflap, rows of lined granules at the base of the coverflap annuli before the anal lobe, empodium rays and longitudinal striae on the female genital coverflap (Table 1). Differences are in the prodorsal shield ornamentation regarding the length of the median line (short broken median line on posterior half of the shield in *A. punicae*) and shape and length of the submedian lines (complete outer submedian lines posteriorly curved and relatively short inner submedian lines in *A. punicae*).

### Key to the species associated with the plants of family Lythraceae

A key of the eriophyoid mite species collected on Lythraceae worldwide is proposed on the base of the most detailed published descriptions.

**Note** – The genus *Punica* was formerly assigned to the family Punicaceae. Currently this genus is in the family Lythraceae, subfamily Punicoideae (The Plant List 2013).

1. Gnathosoma large in comparison to the body; chelicerae abruptly curved and bent down near their base; dorsal opisthosoma with a weak central ridge; empodium divided .....  
..... Diptilomiopidae Keifer ..... Diptilomiopinae Keifer ..... 2
- Gnathosoma small in comparison to the body; chelicerae straight or slightly curved down; opisthosoma variable; empodium entire or divided ..... Eriophyidae Nalepa ..... 4
2. Prodorsal shield pattern composed of cells; tubercles and scapular setae *sc* absent; setae *c2* absent; femoral (*bv*), genual (*l''*) and tibial (*l'*) setae absent on both legs, as well as tubercles and setae *1b* ..... ***Diptilomiopus lagerstroemae* Chakrabarti, Pandit & Mondal, 2008**

**Remarks** – It was described only based on females collected once in May. The male and the juvenile instars are unknown. The drawings are quite essential and some details might have been lost (*e.g.*, lateral lobes of the opisthosoma are not visible). The plant species was originally listed as *L. thorelli* instead of *L. thorelii*, and the

family as Lthraceae instead of Lythraceae. The mite-plant relationships are unknown.

- Prodorsal shield pattern without cells; tubercles and scapular setae *sc* present; setae *c2* present; femoral (*bv*) and tibial (*l'*) setae absent on both legs ..... 3
- 3. Microtubercles in scattered clusters on the opisthosoma; genital coverflap with spines .....  
..... ***Duabangus chiangmai* Chandrapatya & Boczek, 2000**
- Microtubercles not in scattered clusters on the opisthosoma; genital coverflap without spines ...  
..... ***Diptacus duabangiphagus* Das & Chakrabarti, 1993**
- Remarks** – The female description is quite complete even though the measurements regard a range of the studied population. The drawings are quite essential and some details might have been lost (*i.e.*, longitudinal ridges of the opisthosoma are not visible). The paraxial tibial setae on the legs are lacking and the assignment of this species to *Diptacus* should be revised after checking the description and improving the drawings.
- 4. Prodorsal shield with median line, admedian lines and two transverse lines, coxae I fused without sternal line and seta *1b* absent; tibiae fused with tarsi; tibial setae (*l'*) absent; empodium 3-rayed ..... Nothopodinae Keifer ..... ***Cosella speciosae* Huang & Cheng, 2005**
- Remarks** – It was described only on four females collected once in late summer. The male and the juvenile instars are unknown. The female description is quite complete but it seems to regard only one specimen. The drawings are quite essential and incomplete (anterior part of the body, gnathosoma and internal genitalia were not drawn).
- Tibiae always distinct from tarsi; combination of other characters not as above ..... 5
- 5. Body vermiform; scapular setae *sc* present; tubercles of *sc* setae situated slightly ahead of rear shield margin; female genital apodeme bent up and shortened, usually appearing as a heavy transverse line in ventral view; female coverflap appressed to coxae II; seta *1a* present; coxae I usually narrowly connate with a short sternal line; empodium entire .....  
..... ***Colomerus* Newkirk & Keifer (Cecidophyinae Keifer) ..... 6**
- Body variable; scapular setae *sc* and their tubercles variable; female genital apodeme extending moderate distance forward and not appearing as a heavy transverse bar in ventral view; female coverflap well far from coxae II, sternal line usually evident; empodium variable ..... 7
- 6. Prodorsal shield with a median line on the posterior third of the shield ending in a dart-shaped mark, admedian lines on the posterior half converging anteriorly, submedian lines arranged in curved lines, whorls, and dash marks; setae *sc* 10, *e* 42 and *f* 9 .....  
..... ***Colomerus neopiperis* (Wilson, 1970)**
- Remarks** – It was originally found on *Piper jaliscanum* Wats, a plant species belonging to Piperaceae (Wilson, 1970). Later, Ghosh *et al.* (1983) reported it on *Lagerstroemia parviflora* Roxb. (Lythraceae). Only the female was described by Wilson (1970) without information on males and juveniles. The description missed some details and the range values of each trait are not reported. This species was not illustrated by drawings and only light micrographs were published.
- Prodorsal shield with a median line broken in three points, complete admedian and submedian lines and many short lateral lines; setae *sc* 18–21, *e* 18–22 and *f* 19–23 .....  
..... ***Colomerus woodfordis* Ghosh & Chakrabarti, 1989**
- Remarks** – It was described only on females collected once in January. The male and the juvenile instars are unknown. The female description is quite complete even though the measurements regard a range of the studied population.
- 7. Body usually fusiform; prodorsal shield usually with a broad-based and rigid frontal lobe over the gnathosomal base; opisthosoma usually with broad dorsal semiannuli and narrow ventral ones; if frontal lobe is absent or only a slight one is present, then the annuli differ dorso-ventrally, at least in broader dorsal ones ..... Phyllocoptinae Nalepa ..... 8
- Body vermiform, opisthosoma transversely arched, with annuli subequal dorso-ventrally; prodorsal shield lacking a frontal lobe, if a frontal lobe is present, then it is narrow, basally flexible and combined with narrow annuli; tubercles of scapular setae *sc* on the rear shield margin and setae directed to rear ..... ***Aceria* Keifer (Eriophyinae Nalepa) ..... 13**
- 8. Tubercles of scapular setae *sc* usually well formed, often plicate and placed ahead of the rear margin of the prodorsal shield; setae *sc* directed forward, up or centrad; if tubercles *sc* are near the rear margin of the prodorsal shield, then tubercles are subcylindrical and bent forward or the alignment of their bases is longitudinal or diagonal to the body .... Phyllocoptini Nalepa ... 9
- Tubercles of scapular setae *sc* on or very near the rear margin of the prodorsal shield; setae *sc*



- directed backward, usually divergently; tubercles *sc* subcylindrical or their bases are aligned transversally to the body ..... Anthocoptini Amrine & Stasny ..... 10
9. Middorsal ridge on the opisthosoma ending in a broad furrow before the posterior end of the lateral opisthosomal ridges; empodium 5-rayed; setae *c2* 7–8; setae *f* 15–18; setae *h1* absent ....  
..... *Calepitrimerus woodfordis* Das & Chakrabarti, 1985
- Middorsal ridge on the opisthosoma fading simultaneously with the lateral opisthosoma ridges; empodium 4-rayed; setae *c2* 25; setae *f* 30; setae *h1* present .....  
..... *Epitrimerus lythri* Petanović, 1995
- Remarks** – The female description is quite complete even though the measurements regard a range of the studied population. The shape of dorsal palp genual setae *d*, the ornamentation of coxae and the number of semiannuli between coxae and genital coverflap are not mentioned. The drawings are essential and some details regarding female internal genitalia have been lost.
10. Frontal lobe acuminate, never ending with spinules; empodium 4-rayed; dorsal opisthosoma evenly rounded, without any ridge ..... *Aculops longiformis* Joshi, 1990
- Remarks** – This species has been described in a Ph.D. thesis and never published in a Journal. It was described only on females collected once in March. The male and the juvenile instars are unknown. The female description is quite complete and the range values of each trait are not reported. The drawings are essential and many details have been lost.
- Frontal lobe strong; opisthosoma with 3 longitudinal ridges, middorsal stronger than lateral ridges fading caudally ..... *Tegolophus* Keifer ..... 11
11. Median line absent, admedian lines on 2/3 of the prodorsal shield and joined to their posterior end, submedian lines present and posteriorly joined by a curved and transversal line; empodium 3-rayed, dorsal semiannuli with spiny microtubercles only on the median and submedian ridges .....  
..... *Tegolophus dirotuadus* Huang, 2001
- Remarks** – The female description is quite complete even though the measurements regard a range of the studied population and no detailed data are available for the legs. The drawings are quite essential and incomplete (lateral view of the anterior body region, gnathosoma, female internal genitalia and male genitalia were not drawn).
- Median line present ..... 12
12. Median line present on anterior ¼ of prodorsal shield, admedian lines discontinuous; empodium 3-rayed ..... *Tegolophus lagerstroemiae* Tan, Mo, Lu & Wang, 2016
- Remarks** – The narrative description of the prodorsal shield pattern is not completely consistent with its drawing (*e.g.* for the median line).
- Median line on the posterior 1/5 and admedian lines on the posterior ¾ of the prodorsal shield; empodium 4-rayed ..... *Tegolophus parviflorii* Pandit & Chakrabarti, 2007
- Remarks** – It was described only on females collected once in October. The male and the juvenile instars are unknown. The drawings are quite essential and some details might have been lost (*e.g.*, lateral side of the palps, ornamentation on the legs, tibial seta on the leg I).
13. Prodorsal shield pattern composed of many largely broken lines whose arrangement is almost unusual making median, admedian and submedian lines poorly distinguishable; scapular setae *sc* shorter than the prodorsal shield length ..... *Aceria lagerstroemiae* Kuang & Yang, 1994
- Remarks** – It was described only on few females collected once in June. The male and the juvenile instars are unknown. The drawings are quite essential and some details might have been lost (*e.g.*, lateral side of the palps, ornamentation on the legs, palp details, etc.). The description is in Chinese with a very short summary in English. A more standard description should be provided.
- Prodorsal shield with an usual arrangement of lines; scapular setae *sc* at least as long as the prodorsal shield length ..... 14
14. Median line on the posterior half of the prodorsal shield, admedian lines complete; empodium 4-rayed ..... 15
- Median and admedian lines variable; empodium 6-rayed ..... 16
15. With inner and outer submedian lines joined anteriorly; one pair of curved lateral lines connected anteriorly to inner and outer submedian lines, and lines of granules on lateral sides of the shield; scapular setae *sc* 28–33, *h2* 65–94 and *h1* 4–5 long; 52–58 ventral semiannuli .....  
..... *Aceria punicae* Ranjbar-Varandi *et al.*, 2020

- With inner and outer submedian lines joined posteriorly, and small broken lines on lateral sides of the shield; scapular setae *sc* 42, *h2* 60 and *h1* 2 long; 65 ventral semiannuli .....  
..... ***Aceria granati* (Canestrini & Massalongo, 1894)**
  - 16. Curved and broken median line, admedian lines on the posterior 2/3; scapular seta *sc* as long as the prodorsal shield length ..... ***Aceria jovanovici* Petanović, 1993**
- Remarks** – The female description is quite complete even though the measurements regard a range of the studied population. The drawings are quite complete except for the female internal genitalia.
- Median, admedian and inner submedian lines complete, continuous and not connected to each other; scapular seta *sc* almost the double of the prodorsal shield length (Fig. 1) .....  
..... ***Aceria salicariae* Lotfollahi & Tajaddod sp. nov.**

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## اطلاعاتی در مورد کنه‌های اریوفیوئید (Trombidiformes: Eriophyidae) مرتبط با گیاهان تیره Lythraceae همراه با توصیف گونه جدید *Aceria salicariae* از ایران

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### چکیده

در این مقاله یک گونه اریوفیوئید جدید (Trombidiformes: Eriophyidae) با نام *Aceria salicariae* Lotfollahi & Tajaddod **sp. nov.** از ناحیه عجب‌شیر در جنوب شرق استان آذربایجان غربی در ایران توصیف و ترسیم شده است. کلیدی برای کل گونه‌های اریوفیوئید جمع‌آوری شده از روی گیاهان خانواده Lythraceae ارایه شده است. اطلاعاتی در رابطه با میزبان، مکان جمع‌آوری و ارتباط نمونه‌های تیپ با گیاه میزبان و همین‌طور ملاحظات در رابطه با توصیف‌های در دسترس تهیه شده است.

**واژگان کلیدی:** *Aceria salicariae*؛ عجب‌شیر؛ مهار زیستی؛ ماده؛ گیاهخوار؛ گیاهان تیره Lythraceae.

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