

ENRICO DE LILLO* - ROUHOLLAH SOBHIAN†**

A new Eriophyid species (Acari Eriophyoidea) on *Salsola* spp. (Centrospermae Chenopodiaceae) and a new report for *Aceria tamaricis* (Trotter)°

ABSTRACT

A new eriophyid species is described and illustrated. *Aceria salsolae* n. sp. was observed on *Salsola kali* L. and *S. australis* Brown (Centrospermae Chenopodiaceae) in Turkey, Greece and Uzbekistan. Although the mite does not form galls, the infested plants were stunted, deformed, less spiny, and their vigor was impacted. Host specificity tests, carried out in Turkey, indicate that this species is a promising candidate for the biological control of *S. australis* in the U.S.A.

A. tamaricis (Trotter) has been also found on *Tamarix smirnensis* Bunge in Turkey.

Key words: mites, Eriophyidae, weeds, biological control.

INTRODUCTION

The ability of eriophyid mites to reduce or to stop the growth and the reproduction of plants suggests research on the identification and selection of promising candidates for the biological control of the weeds (CROMROY, 1978; BOCZEK, 1995; ROSENTHAL, 1996; NUZZACI & DE LILLO, 1996). We found growth deformations caused by eriophyids on *Salsola* spp. and *Tamarix smirnensis* Bunge. No eriophyoids have been found on *Salsola* spp. until now. The importance of *Tamarix* spp. as weeds in U.S.A was noted in a previous paper (DE LILLO & SOBHIAN, 1994). *Salsola australis* is of Eurasian origin, and troublesome in pastures, recreational areas, road sides, etc. mainly in dry areas in the U.S.A.

* Institute of Agricultural Entomology, Faculty of Agriculture, University of Bari, v. Amendola, 165/A, Bari, Italy.

** USDA-ARS, European Biological Control Laboratory - BP 4168, Agropolis II, 34092 Montpellier Cedex 5, France.

° This research was partially supported by M.U.R.S.T. 40% grant and by USDA-ARS grants. The senior author provided mainly the morphological description and illustration, the junior author provided to the field observations; both cooperated in writing the manuscript.

MATERIALS AND METHODS

Dried and preserved (in 70% ethanol solution) eriophyids were prepared using the usual methods applied for light microscopy (JEPPSON *et al.*, 1975) and scanning electron observations (NUZZACI *et al.*, 1991).

Lindquist's terminology (1996) of the morphological details has been adopted. Measurements of mites were made according to Amrine and Manson (1996). The classification of the genus was made according to Amrine (1996). Type materials are deposited at the Institute of Agricultural Entomology, Faculty of Agriculture, University of Bari, Italy.

DRAWING ABBREVIATIONS

AP1, internal female genitalia; CS, lateral view of a caudal region; DA, dorsal view of an anterior region; E, empodium; ES, lateral view of tergite-sternites or annuli; GF, coxal and genital region of a female; L, foreleg; SA, lateral view of anterior region.

Aceria salsolae n. sp.

Female - Body cylindrical, colour yellowish, 172 (140-205 range of 10 specimens) μm long, 41 (39-46) μm wide and 41 (35-53) μm thick. Gnathosoma 23 (21-26) μm long projecting obliquely, chelicerae 17 (14-20) μm long, seta d (=subapical, antapical)¹ 7 μm long. Prodorsal shield 27 (25-29) μm long, 30 (28-33) μm wide, semicircular in anterior shape with short and rounded anteriormedian lobe over gnathosoma base; shield with median line on rear 1/3, complete admedian line, complete submedian line and granules on each side; median and admedian lines are composed of very close dashes, submedian lines composed of well separated granules. Sc (=posterior dorsal) tubercles set on rear shield margin 20 (19-21) μm apart with sc (=posterior dorsal) setae 42 (32-52) μm long, directed to the rear.

Foreleg 36 (31-40) μm long, tibia 8 μm long, tarsus 7 μm long, w (solenidion) 6 μm long, unknobbed, empodium 7 μm long, 5-rayed simple. Hindleg 31 (30-33) μm long, tibia 7 μm long, tarsus 7 μm long, w 6 μm long, unknobbed, empodium 6 μm long, 5-rayed simple. Coxae with ornamentation of coarse granules; 1b (=first forecoxal) setae 10 (8-11) μm long, 1b tubercles 10 μm apart, 1a (=second forecoxal) setae 30 (25-35) μm long, 1a tubercles 7 μm apart, 2a (=hindcoxal) setae 41 (32-50) μm long, 2a tubercles 21 μm apart.

¹ The term of the structures usually used until now are reported after the Lindquist's term and between brackets.

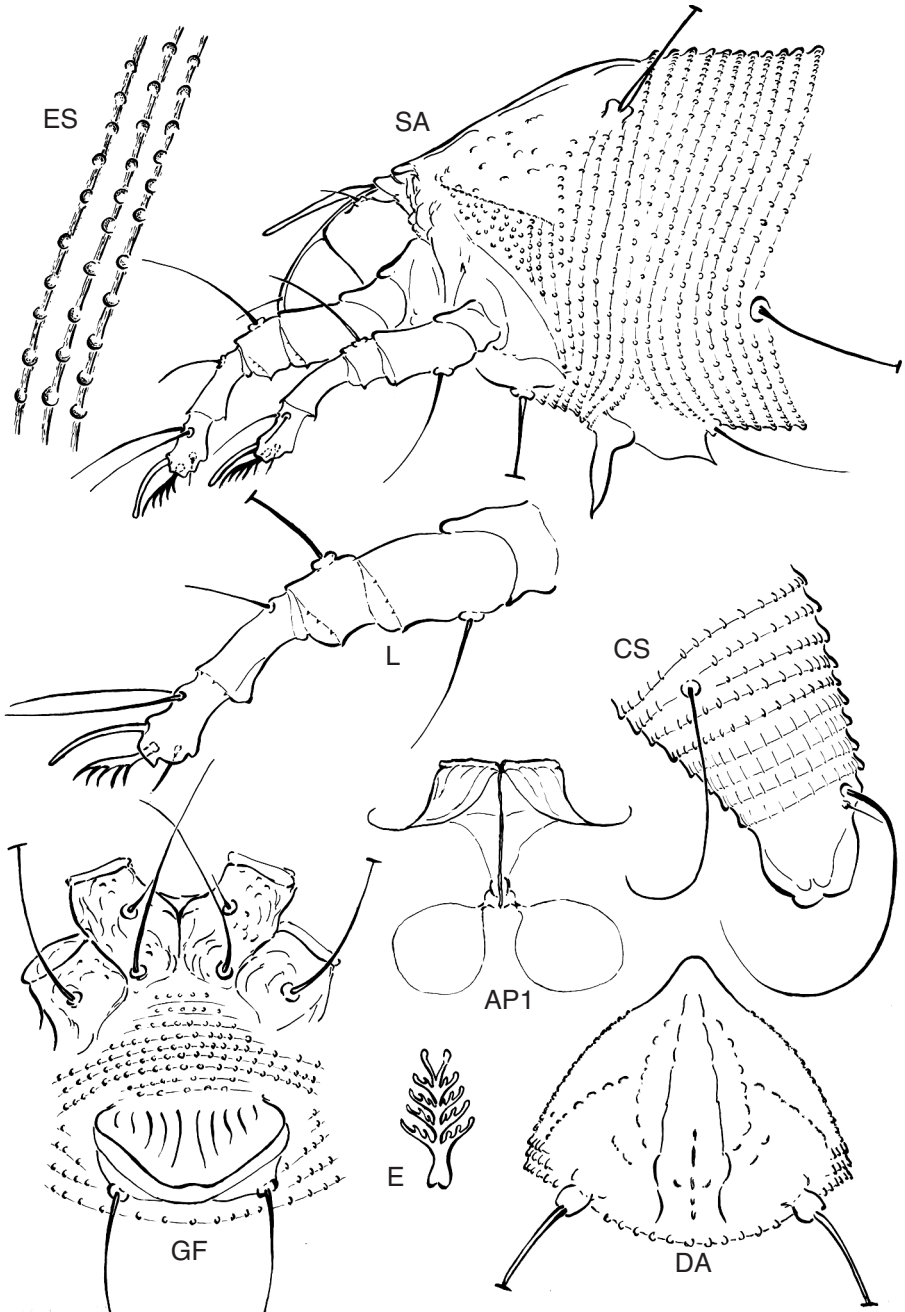


Fig. 1 - Semischematic drawings of *Aceria salsolae* n. sp.

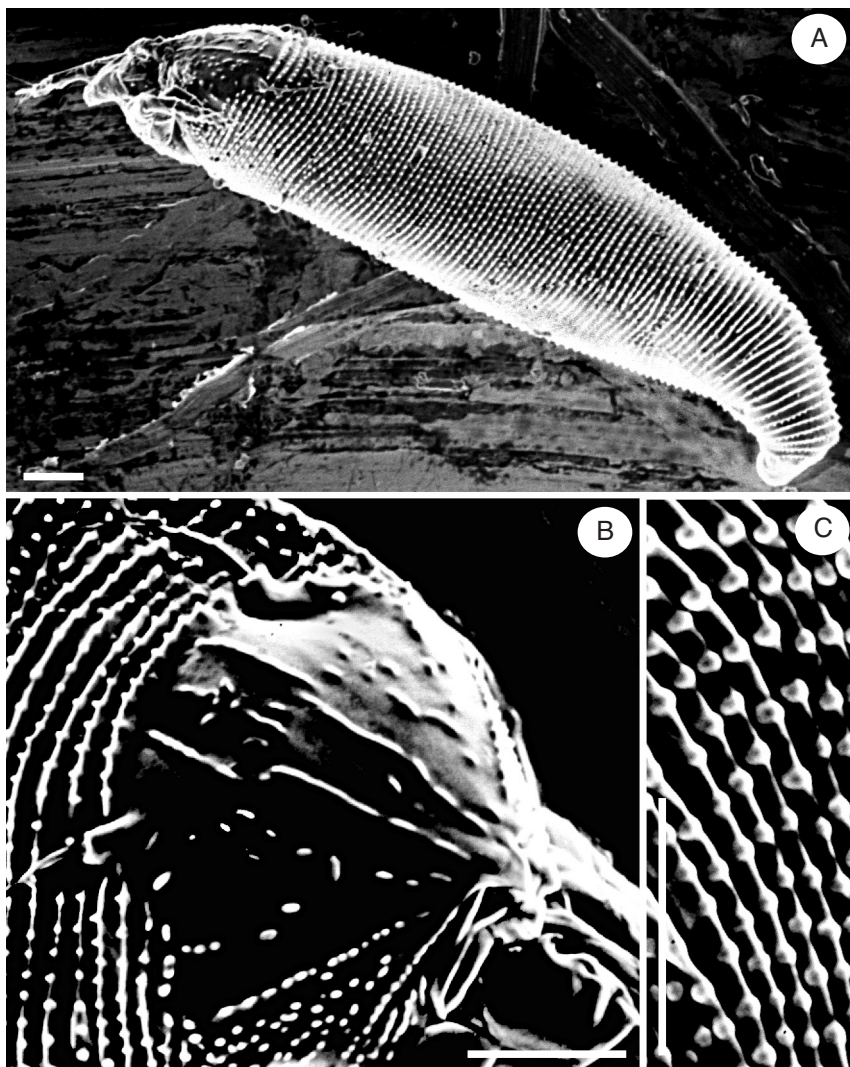


Fig. 2 - Scanning electron micrographs of *Aceria salsolae* n. sp.: A) subdorsal view; B) detail of the prodorsal shield; C) detail of the microtubercles. Scale bar = 10 μ m.

Prosternal apodeme (=sternal line) 5 μ m long.

Opisthosoma with 74 (70-79) annuli (=rings). Microtubercles near rear margins of annuli, rounded.

c2 (=lateral) setae 48 (40-60) μ m long on annulus 12 (11-13); d (=1st ventral) setae 58 (48-70) μ m long on annulus 6 (24-27); e (=2nd ventral) setae 44



Fig. 3 - A) *Salsola australis* infested with *A. salsolae* (late in season - October 1995); B) *S. australis* infested with *A. salsolae* (early in season), one healthy branch on the left, four infested branches on the right of the photo (May 1996).

(33-50) μm long on annulus 44 (40-46); f (=3rd ventral) setae 40 (30-60) μm long on annulus 67 (62-72). Last 5 (4-6) annuli with elongated and linear tubercles; h2 (=caudal) setae 70 (64-86) μm long, h1 (=accessory) setae 5 μm long. Genitalia 11 (10-13) μm long, 21 (20-22) μm wide. Genital coverflap with 10 longitudinal striae; 3a (=genital) setae 14 (12-15) μm apart, 18 (16-20) μm long. MALE - 145 μm long, 34 μm wide, prodorsal shield 22 μm long; sc tubercles 17 μm apart, sc setae 31 μm long; opisthosoma with about 68 annuli. Genitalia 17 μm wide.

NYMPH II - 148 μm long; prodorsal shield 22 μm long; sc tubercles 14 μm apart, sc setae 23 μm long; opisthosoma with about 58 annuli; genital setae 6 μm apart, 7 μm long on annulus 8.

Host plant - *Salsola kali* L. (Fam. Chenopodiaceae).

Type materials - Holotype 1 slide containing 9 females, 1 male and 2 nymphs; Paratypes: 3 slides with many females, males and nymphs collected at the same date and locality.

Type locality - Yakasinek, 12 Km east of Cay, Turkey. September 12, 1995, R. Sobhian.

Other material - envelope of dry stems and leaves and mummified mites from which the above slides were made; vial of stems and leaves with mites preserved in 70% ethanol.

Other locality - The mite was first found on August 11, 1995, 12 km east of Cay, Turkey. It was also found 20 km east of Isparta (at over 1000 m elevation) and 25-30 km north west of Sivrihisar, along the road to Afyon, Turkey. It was very common on *Salsola australis* Brown near Kokan (Uzbekistan), 47 km west of Tashkent, and in many other sites in Uzbekistan. J. Kashefi collected it on *S. kali* on October 2, 1995 at Dimitra on road Amphipoli to Serres (Macedonia), Greece.

Other host - *S. australis* Brown.

Remarks - Nine *Aceria* spp. have been found on plants belonging to the family Chenopodiaceae (AMRINE & STASNY, 1994) but any of them is morphologically similar to *A. salsolae* and any of them causes similar injuries to the host plants.

Relation to the host - Mites do not make galls. The infested plants remain stunted and less spiny (fig. 3). The mites were in large numbers among the leaflets, especially at their bases. The seed production is dramatically reduced on infested plants.

As the infested plants are less spiny, cattle might prefer them as forage more than the uninfested plants.

In a host specificity test carried out in Antalya, Turkey, the mite readily

attacked *S. australis* from California and *S. australis* from Turkey (control), while none of the other six plants including sugar beet, table beet, and spinach, were susceptible hosts (Sobhian, unpublished data). The results of the host specificity test and the fact that the mite has been found on *S. australis* indicate that it is a promising candidate for the biological control of *S. australis* in the U.S.A.

Aceria tamaricis (Trotter)

Large populations of *A. tamaricis* were found on *T. smirnenensis* in Efes, near Izmir, Turkey, 10 September, 1995, and they were associated to galls similar to those caused on *T. gallica* L. in France. This is the first report of an eriophyid mites on *T. smirnenensis*.

ACKNOWLEDGEMENTS

We wish to thank Dr. J. Kashefi, USDA-ARS, European Biological Control Laboratory, Thessaloniki, Greece, who collected samples of *Salsola kali* L. from Greece, Prof. J.W. Amrine Jr., West Virginia University, U.S.A. for confirming the new species, Prof. G. Nuzzaci, Institute of Agricultural Entomology, Bari, Italy, and Dr. L. Knutson, USDA-ARS, European Biological Control Laboratory, Montpellier, France for the critical review of the manuscript.

RIASSUNTO

UNA NUOVA SPECIE DI ERIOFIDE (ACARI ERIOPHYOIDEA) SU *SALSOLA* SPP. (CENTROSPERMAE CHENOPODIACEAE)
E UNA NUOVA SEGNALAZIONE PER *ACERIA TAMARICIS* (TROTTER)

Viene descritta e illustrata una nuova specie di Eriofide. *Aceria salsolae* sp. n. è stata raccolta su *Salsola kali* L. e *S. australis* Brown (Centrospermae Chenopodiaceae), in Turchia, Grecia e Uzbekistan. Le piante infestate mostravano crescita stentata, deformazioni, minore spinosità e ridotto vigore. Prove di specificità dell'ospite, eseguite in Turchia, hanno evidenziato come questa specie sia un promettente candidato per il suo controllo di *S. australis* negli U.S.A.

A. tamaricis (Trotter) viene segnalata per la prima volta su *Tamarix smirnenensis* Bunge in Turchia.

Parole chiave: acari, Eriophyidae, erbe infestanti, controllo biologico.

REFERENCES

- AMRINE J.W.JR., 1996 - Keys to the world genera of the Eriophyoidea (Acari: Prostigmata). Indira Publ. House, West Bloomfield, Michigan, USA, 187 pp.
- AMRINE J.W.JR., MANSON D.C.M., 1996 - Preparation, mounting and descriptive study of Eriophyoid mites. In: Lindquist E.E., Sabelis M.W., Bruin J. (eds), Eriophyoid Mites - Their Biology, Natural Enemies and Control. Elsevier Science Publ., Amsterdam, The Netherlands, World Crop Pests, vol. 6: 383-396.

- AMRINE J.W., JR., STASNY T.A., 1994 - Catalog of the Eriophyoidea (Acarina: Prostigmata) of the world. Indira Publishing House, West Bloomfield, Michigan, USA, 798 pp.
- BOCZEK J., 1995 - Eriophyid mites as agents of biological weed control. In: Kropczynska D., Boczek J., Tomczyk A. (eds.), *The Acari. Physiological and ecological aspects of Acari-host relationships*. Oficyna Dabor, Warszawa: 601-606.
- CROMROY H.L., 1978 - The potential use of eriophyoid mites for control of weeds. In: T.E. Freeman (ed.), *Proc. IV Int. Symp. Contr. Weeds*, Aug. 30-Sept. 2, 1976, Univ. Florida, Gainesville, Florida, USA: 294-296.
- DE LILLO E., SOBHIAN R., 1994 - Taxonomy, distribution, and host specificity of a gall-making mite, *Aceria tamaricis* (Trotter) (Acari: Eriophyoidea), associated with *Tamarix gallica* L. (Parietales: Tamaricaceae) in southern France. *Entomologica*, Bari, 28: 5-16.
- JEPPSON L.R., KEIFER H.H., BAKER E.W., 1975 - Mites injurious to economic plants. Univ. California Press, 614 pp + 74 tabb.
- LINDQUIST E.E., 1996 - External anatomy and notation of structures. In: Lindquist E.E., Sabelis M.W., Bruin J. (eds), *Eriophyoid Mites - Their Biology, Natural Enemies and Control*. Elsevier Science Publ., Amsterdam, The Netherlands, *World Crop Pests*, vol. 6: 1-30.
- NUZZACI G., DE LILLO E., 1996 - Perspectives on Eriophyoid mite research. *Entomologica*, Bari, 30: 73-91.
- NUZZACI G., DE LILLO E., MARIANI R.G., 1991 - Scanning microscopy in Acarology: a new technique for preparation of Eriophyoids preserved in different ways. *Boll. Soc. Entomol. it.*, Genova, 123(1): 3-8.
- ROSENTHAL S.S., 1996 - Biological control of weeds. *Aceria*, *Epitimerus* and *Aculus* species and biological control of weeds. In: Lindquist E.E., Sabelis M.W., Bruin J. (eds), *Eriophyoid Mites - Their Biology, Natural Enemies and Control*. Elsevier Science Publ., Amsterdam, The Netherlands, *World Crop Pests*, vol. 6: 729-739.