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A new species of *Aceria (Acari: Eriophyidae)* from *Convolvulus arvensis* L. *(Convolvulaceae)* with notes on other eriophyid associates of convolvulaceous plants [3]

ABSTRACT

Aceria malherbae n. sp. (*Acari*: *Eriophyidae*) is described and illustrated from field bindweed, *Convolvulus arvensis* L. The eriophyid mite species that are known to occur on plants in the *Convolvulaceae* are also listed.

INTRODUCTION

Convolvulus arvensis L., field bindweed, is one of the most troublesome perennial weeds in the temperate regions of the world (WEAVER and RILEY, 1982).In the United States, the weed is a serious pest of grain, vineyards, orchards, and other cultivated crops; it is also very common along roadsides, in fallow fields and waste places (e.g. PHILLIPS, 1978; ROSENTHAL, 1983 a). WANG and KOK (1985) recently reviewed the pestiferous nature of field bindweed.

Because of the difficulty and expense of controlling field bindweed by cultural and chemical methods, practitioners of biological weed control have tried to find insects and mites that could be used to help control this weed. As a result of surveys and preliminary host specificity tests in southern Europe by ROSENTHAL (1981; 1983 b) and ROSENTHAL and BUCKINGHAM (1982) in the 1970's, eriophyid mites were identified as promising biological control

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agents for field bindweed in the United States. Eriophyids are of particular interest to weed biocontrol workers because of their tendency to be highly host specific (CROMROY, 1978).

The mites used in the aforementioned preliminary host specificity tests were not tested against native North American plants (*Calystegia* spp.) closely related to *C. arvensis*, which must be done for candidate biocontrol agents of field bindweed (ANDRES, 1981). Therefore, CLEMENT *et al.* (1983) were prompted to study the ability of an eriophyid species to harm North American *Calystegia* spp. when a small population was found distorting the leaves and buds of *C. arvensis* (Fig. 1) near Rome, Italy in June 1982. These workers did not, however, establish the identity of the mite to the species level.

The goal of this study was to document the known eriophyid — host plant associations in the *Convolvulaceae* and to establish the identity of the mite species studied by CLEMENT *et al.* (1983). A species determination is needed for this mite so weed biocontrol workers can contrast and compare its host plant utilization patterns with these of other populations and species that occur on *C. arvensis* in Europe and which may be selected for use in additional host specificity tests.

ERIOPHYID ASSOCIATES OF THE *Convolvulaceae*

A review of the literature (HOUARD, 1909, 1922; JEPPSON *et al.*, 1975; DAVIS *et al.*, 1982; MOHANASUNDARAM, 1983; NEWKIRK, 1984) revealed the the following eriophyid mite associations with convolvulaceous plants: *Eriophyes ipomoeae* Cook on *Ipomoea* sp.; *E. altus* Nalepa on *Ipomoea denticulata* (Desr.) Choisy and *I. gracilis* R. BR.; *E. convolvuli* Nalepa on *Convolvulus arvensis* and *C. altheoides* L.; *E. merremiae* Nalepa on *Merremia gemella* (Burm. F.) Hallier f.; *E. gastrotrichus* Nalepa on *I. batatas* (L.) Lam. and *I. staphilina* Roem. et Schult.; *E. lepistemonis* Nalepa on *Lepistemon binectariferus* (Wall.) O. Kunze and *L. flavescens* Blume; *Phyllocoptes convolvoli* Nalepa on *C. arvensis* L.; *Tegonotus convolvuli* (Chan.) on *Ipomoea* spp. (*batatas*, *palmata*, *sepiaria*).

Slide mounts and scanning electron micrographs of specimens from the Rome population studied by CLEMENT *et al.* (1983) were made to facilitate comparisons with Nalepa's (1909, 1911, 1914, 1918, 1921) published species descriptions. The same procedure was followed to identify specimens collected on *C. arvensis* at the agricultural research farm of the University of Thessaloniki, Thermi, Greece.

Examination of the specimens by the first author and comparison of them with Nalepa's descriptions revealed that the mite from the two locations was an undescribed species. This new species, *Aceria malherbae* n. sp., is described below. Measurements with a variance component (± SD) are based on a series of six specimens.

Aceria malherbae Nuzzaci n. sp.
(Figs. 2-3)

Female. — 190 ± 20 μm long, 45 ± 5 μm wide; wormlike; light yellowish-white. Rostrum 18 μm long, curved downward; antapical rostral seta 6 μm long. Dorsal shield 28 ± 2 μm long, 32 ± 2 μm wide with a small but distinct lobe over rostrum. Shield pattern with short median line, indistinct and approaching rear shield margin and about 1/2 as long as the admedian line and slightly shorter than the oblique submedian line on each side; each admedian line curving slightly inwards at both ends; oblique submedian lines approaching dorsal tubercles anteriorly; sides of shield beyond oblique submedian line with 3 lines, the most lateral one shorter than 1/2 the length of the other two and near the lateral edge in the anterior 1/2 of shield, the intermediate line mostly in the anterior 1/2 and the dorsal line mostly in the posterior 1/2 of the shield. Dorsal tubercles on rear margins of shield, 24 μm apart; dorsal setae 24 μm long, diverging laterally to rear. Forelegs 35 μm long from trochanter base; tibia 6.5 μm long; tarsus 7 μm long; empodium 6.5 μm long, 6-rayed. Hindlegs 35 μm long; tibia 6 μm long; tarsus 6.5 μm long; empodium 6 μm long. Coxae with some minute granules. Opisthosoma with about 56 rings, completely microtuberculate; microtubercles projecting over and touching ring margins dorsally, extending forward of ring margins ventrally. Lateral seta 40 μm long, arising from ring 11; first ventral seta 42 μm long on ring 20, 2nd ventral seta 17 μm long, arising between ring 32. Third ventral seta 24 μm long on ring 50. Accessory seta 4.5 μm long. Female epiginium 12 μm long, 20 μm wide, with 10 longitudinal ribs; genital seta 20 μm long.

Male. — 160 ± 20 μm long, morphologically similar to the female.

Host. — *Convolvulus arvensis* L. (*Convolvulaceae*).

Type locality. — Near Rome; 9 km north of the beginning of highway

A16 in a *Eucalyptus* sp. grove at the west pullout for the IP automobile service station. Thermi, Greece near the airport on the agricultural research farm, University of Thessaloniki.

Collection dates. — Near Rome, Italy on October 7, 27 and December 10, 1982 and May 4, 1983 by T. MIMMOCCHI and S. L. CLEMENT. Near Thermi, Greece on October 15, 1982 by A. STAHL.

Relation to host. — Colonization of *C. arvensis* results in considerable contortion to leaves and buds (Fig. 1). Leaf feeding starts on the upper

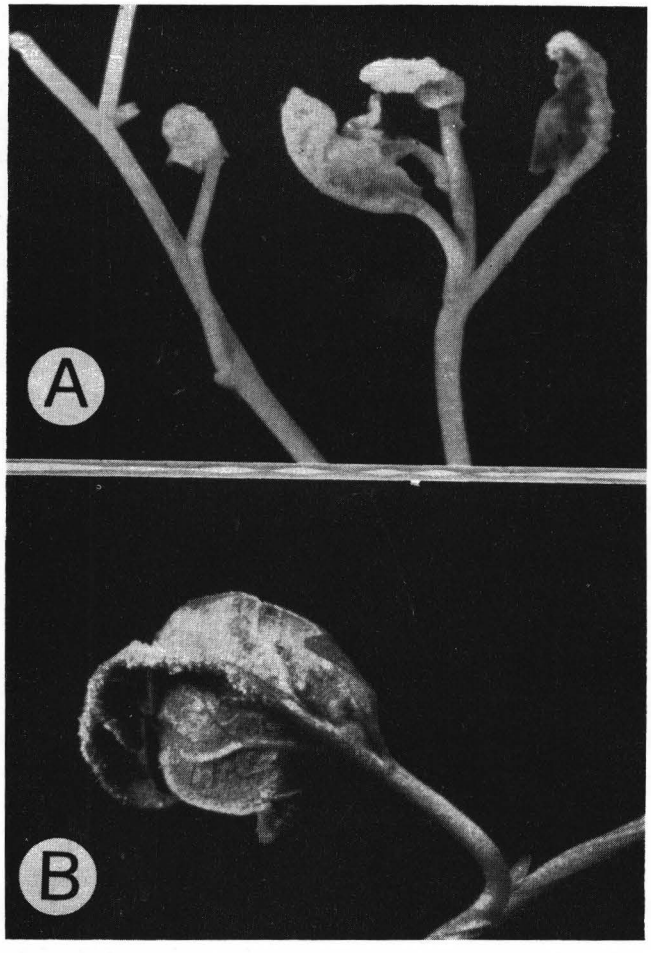

Fig. 1 - *Convolvulus arvensis* L.; A, sprout showing damage caused by *Aceria malherbae* n. sp.; B, close-up of a damaged leaf.

surface alongside the midrib, usually towards the distal end of the leaf. This feeding causes leaf furrowing along the midrib, then along lateral veins as mites increase in number and move laterally. A heavily infested leaf has numerous tight furrows and folds across the upper surface; it eventually becomes wrinkled and twisted along its whole length. The mite colonies reside in tight leaf folds. Mite attacks cause an abnormal growth of very small tubercles from leaf epidermis. The mite causes buds to swell and become irregular in appearance.

Mites and distorted plants were also found at the Rome site in February (1983), April (1983, 1985), May (1983-1985), June (1986), July (1983),

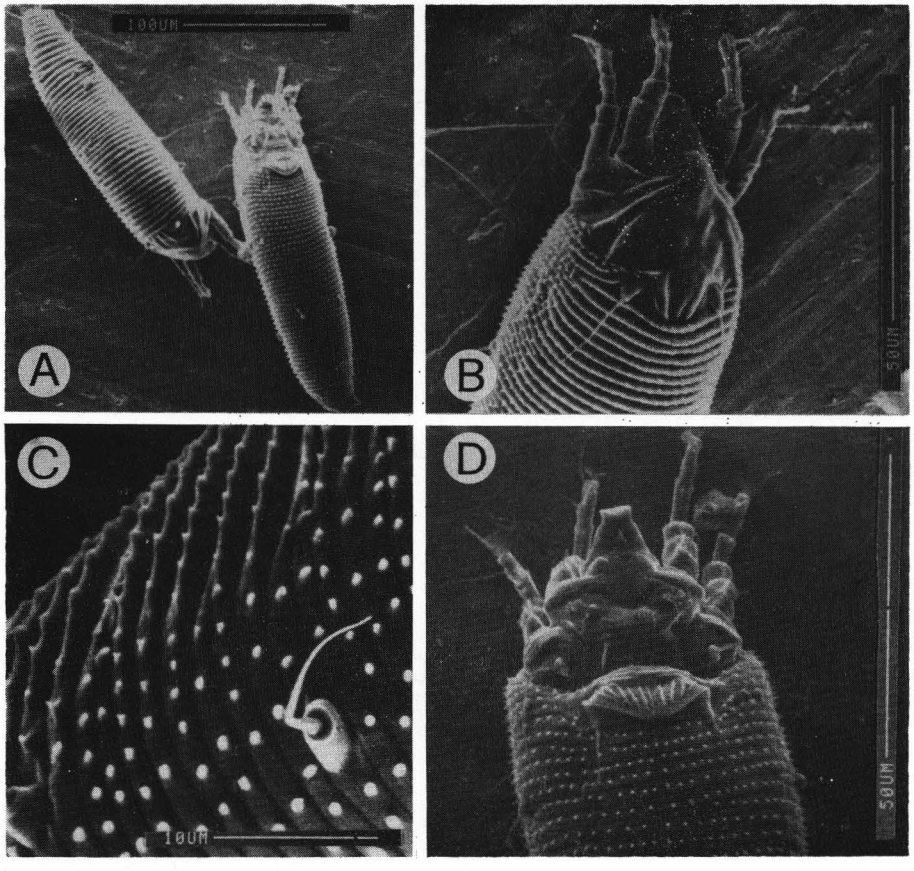

Fig. 2 - *Aceria malherbae* n. sp., scanning electron micrographs: A, adult dorsal view on the left, and adult ventral view on the right; B, subdorsal view of adult anterior portion; C, close-up of the microsculptures at the lateral seta level; D, ventral view of a female, anterior portion.

and from late August to December (1982). The mite appeared to overwinter in buds at or a few cm below the soil surface.

Type material. — Holotype, female and 9 paratype females and 1 male,

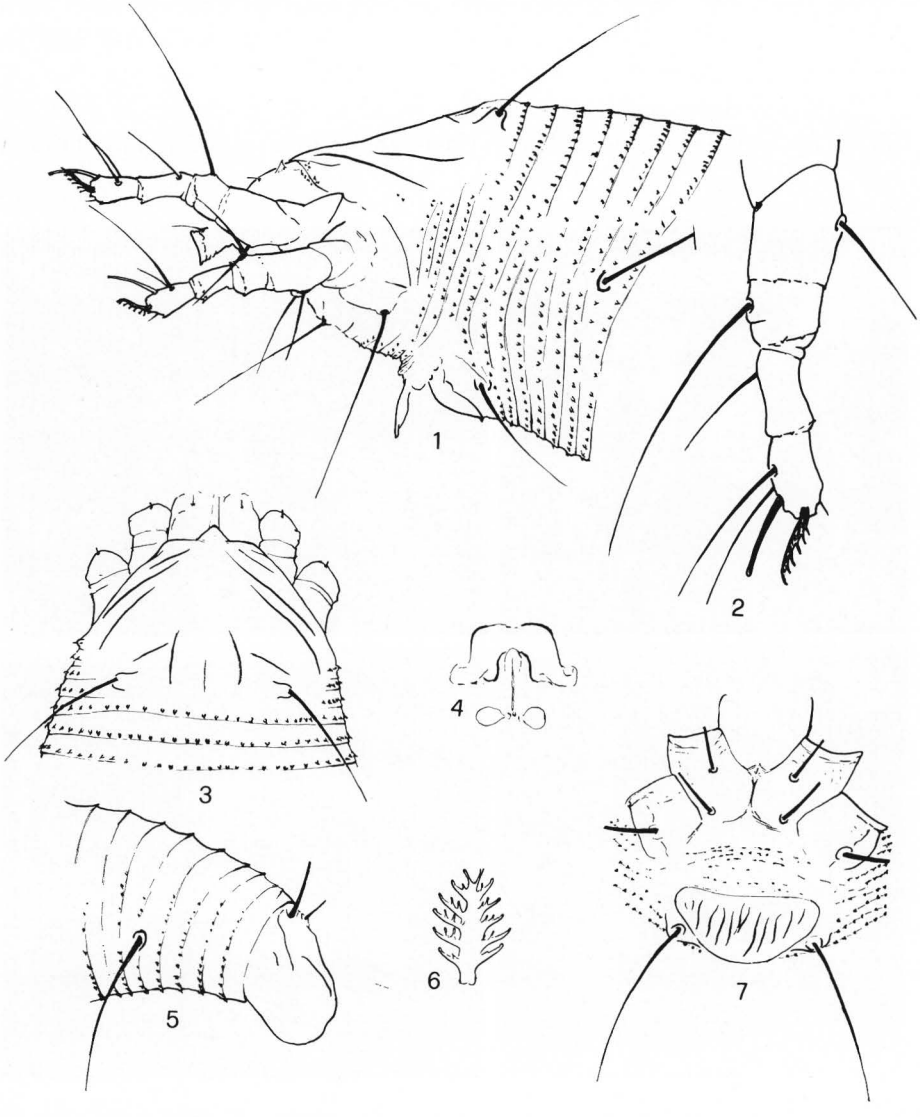

Fig. 3 - *Aceria malherbae* n. sp.: 1, anterior lateral view; 2, left anterior leg; 3, anterior dorsal view; 4, internal female genitalia; 5, posterior lateral view; 6, empodium; 7, external female genitalia.

all collected October 27, 1982, Rome, Italy. Type material is deposited in the personal collection of the first author (dried leaves and buds containing dead mites), the Institute of Agricultural Entomology, University of Bari, Italy (12 paratypes on slides); the Experimental Institute for Agricultural Zoology, Florence, Italy and U.S. National Museum of Natural History, Washington, D.C. (2 paratypes on slides; dried leaves and buds containing dead mites at each location).

NALEPA'S (1911) general descriptions of the plant abnormalities caused by *E.* (= *Aceria*) *convolvuli* indicate that this mite and *A. malherbae* cause the same type of injury to field bindweed. Thus, it might be difficult to use plant injury symptoms as a diagnostic character to identify the two species. However, the two species can be morphologically separated. The dorsal shield pattern of *E. convolvuli* consists of one complete median line, two complete admedian lines from the posterior to the anterior shield margin, and two pairs of submedian lines beginning at a point just anterior to dorsal tubercles and terminating at the anterior shield margin. In contrast, *A. malherbae* has a much simpler shield pattern and diagnostically shorter setae. Moreover, the new species has 56 opisthosomal rings versus 88 for *E. convolvuli.*

On the basis of NALEPA'S descriptions (1909, 1914, 1918, 1921), four *Eriophyes* (= *Aceria*) species known from other convolvulaceous plant genera can be distinguished by the following charateristics:

Eriophyes altus	absence of pattern on the propodosomal shield, 5-rayed empodium; causes pouch galls.
E. merremiae	propodosomal shield pattern tipically reticular, high number of opisthosomal rings (ca. 80), 5-rayed empodium; causes semispherical galls.
E. gastrotrichus	shield pattern different from the new species, first and second ventral setae very long (ca. 60 μm); causes pouch galls.
E. lepistemonis	shield pattern different from the new species, ca. 76 opisthosomal rings; causes pouch galls.

Distinguishing characters for *E. ipomoeae* Cook are not provided because an original taxonomic description of this mite was not available.

Phyllocoptes convolvoli Nalepa and *Tegonotus convolvuli* (Chan.) belong to two different genera, thus they can be easily distinguished by their tapered bodies and other characters typical of mites in these genera.

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RIASSUNTO

Viene descritta una nuova specie di Acaro Eriofile (*Acari*: *Eriophyidae*) *Aceria malherbae* n. sp. che causa distorsioni e ripiegamenti lungo la venatura principale delle foglie di *Convolvolus arvensis* L.

Femmina, lunga 190 ± 20 μm e larga 45 ± 5 μm; di aspetto vermiforme e di colore bianco-giallastro chiaro.

Rostro lungo 18 μm con la setola distale dei pedipalpi di 6 μm.

Scudo dorsale (prodorso) lungo 28 ± 2 μm, largo 32 ± 2 μm e provvisto di un corto lobo sul rostro. Disegno dello scudo con una breve e poco evilente linea mediana vicina al margine posteriore dello stesso scudo; linee admediane circa il doppio della precedente e convergenti anteriormente; linee submediane oblique ed anteriori ai tubercoli dorsali. Lati dello scudo con tre evidenti linee longitudinali delle quali la laterale lunga solo 1/2 delle altre due; l'intermedia limitata alla metà anteriore dello scudo e la dorsale nella metà posteriore dello stesso.

Tubercoli dorsali sul margine posteriore dello scudo e distanti tra loro 24 μm. Setole dorsali lunghe 24 μm rivolte posteriormente.

Zampe anteriori (dalla base del trocantere) lunghe 35 μm e con tibia lunga 6,5 μm, tarso lungo 7 μm ed empodio 6-pennato e lungo 6,5 μm. Zampe posteriori di 35 μm con la tibia di 6 μm, il tarso di 6,5 μm e l'empodio lungo 6 μm. Coxe con una fine e rada granulazione.

Opistosoma di circa 56 anelli completamente microtubercolati; i microtubercoli dorsalmente toccano il margine posteriore dell'anello mentre ventralmente sono discosti dallo stesso.

Setola laterale lunga 40 μm ed impiantata sull'anello undicesimo; prima setola ventrale lunga 42 μm ed impiantata sull'anello ventesimo; seconda setola ventrale lunga 17 μm ed impiantata all'altezza del trentaduesimo anello; terza setola ventrale lunga 24 μm sul cinquantesimo anello. Setola accessoria 4,5 μm.

Epigino lungo 12 μm e largo 20 μm con circa 10 venature longitudinali; setola genitale lunga 20 μm.

Maschio, simile alla femmina, ma proporzionalmente più piccolo.

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