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## ***Amblyseius californicus* (McGregor, 1954) (Acari: Phytoseiidae), a New Record for the Turkish Fauna**

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**Abstract:** During 2001-2003, *Amblyseius californicus* (McGregor) was collected from the strawberry, peach, bean and pepper, where it was associated with *Tetranychus urticae* and *Panonychus ulmi* in Kuşadası, Aydın, Turkey. The descriptions and drawings of male and female *A. californicus*, which is a new record for the Turkish fauna, are given.

**Key Words:** Acari, Phytoseiidae, *Amblyseius californicus*, strawberry, peach, bean, pepper, predatory mite, Turkey

### ***Amblyseius californicus* (McGregor, 1954) (Acari: Phytoseiidae), Türkiye Faunası İçin Yeni Bir Kayıt**

**Özet:** *Amblyseius californicus* (McGregor) Aydın'ın Kuşadası ilçesinden çilek, şeftali, fasulye ve biber üzerinden *Tetranychus urticae* ve *Panonychus ulmi* yle ilişkili olarak, 2001-2003 yılları arasında elde edilmiştir. Türkiye faunası için yeni kayıt olduğu saptanan *Amblyseius californicus*'a ait dişi ve erkek bireyler üzerinden çizilmiş şekiller ve yapısal özellikler verilmiştir.

**Anahtar Sözcükler:** Acari, Phytoseiidae, *Amblyseius californicus*, çilek, şeftali, fasulye, biber, avcı akar, Türkiye

### **Introduction**

Phytoseiid mites have been studied extensively with respect to their potential for the biological control of phytophagous mites in greenhouses, and on strawberry and deciduous fruit (Helle and Sabelis, 1985). McMurtry (1982) listed phytoseiids now being used or with the potential of being used in control programs against agricultural and horticultural pests. One of these species being used in control programs is *Amblyseius californicus*, also known as *Neoseiulus californicus*. This predatory mite originates from California and Florida, and is used extensively in biological control programs against red spider mites (*Tetranychus urticae* Koch, Tetranychidae) on a global scale (Hart et al., 2002). *A. californicus* is widely used in the Mediterranean region, particularly southern France, Italy and Spain, where it is reported to occur naturally (Raworth et al., 1994; Castagnoli and Simoni, 1999; Griffiths, 1999). Previous studies on phytoseiids in Turkey showed no indication of the

presence of *A. californicus* (Swirski and Amitai, 1982; Düzgüneş and Kılıç, 1983; Şekeroğlu, 1984; Çobanoğlu, 1987, 1989, 2002, Özkan et al., 1988; Şekeroğlu and Kazak, 1993; Çakmak, 2002). During 2001-2003, we found *A. californicus* on the strawberry, peach, bean and pepper in Kuşadası, Aydın, Turkey, where it was associated with *Tetranychus urticae* and *Panonychus ulmi*. This is a new record for the predatory mite fauna of Turkey.

### **Materials and Methods**

Samples of *A. californicus* were obtained from the strawberry, peach, bean and pepper from Kuşadası, Aydın, between 2001 and 2003. The predatory mites were preserved in 70% ethyl alcohol. After clearing the mite samples in lactophenol solutions, they were mounted in Hoyer's medium. Identification was based on Athias-Henriot (1959) and Schuster and Pritchard (1963). All measurements are given in micrometers (µm). Mounted

specimens were also compared with those of the Koppert strain of *A. californicus* cultured at the Section Population Biology, Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam, The Netherlands. The samples have been deposited in the collection of both authors at the Adnan Menderes University, Plant Protection Department, Aydın, and the University of Ankara, Plant Protection Department, Ankara.

## Results

Family: Phytoseiidae

Genus: *Amblyseius* Berlese, 1915

Species: *Amblyseius californicus* (McGregor, 1954)

### Female

Dorsum: Dorsal plate  $391.43 \pm 2.94$  (375-405)  $\mu\text{m}$  long and  $180.71 \pm 4.28$  (165-200)  $\mu\text{m}$  wide ( $n = 14$ ). Dorsal plate reticulate and with 4 pairs of pores. This species has 4 pairs of prolateral and 5 pairs of postlateral setae on the dorsal plate. One pair of vertical, 4 pairs of dorsocentral, 9 pairs of dorsolateral, 2 pairs of mediolateral and a pair of clunal setae placed on the dorsal plate and their length are measured as follows. Vertical setae:  $23.66 \pm 0.87$  (17.5-30); Dorsocentrals I:  $23.66 \pm 1.11$  (17.5-30); II:  $23.65 \pm 0.78$  (20-27.5); III:  $31.04 \pm 0.84$  (25-35); IV:  $34.23 \pm 0.86$  (30-40); Dorsolaterals I:  $33.75 \pm 0.91$  (27.5-40); II:  $30.16 \pm 0.86$  (22.5-36); III:  $31.07 \pm 0.50$  (27.5-35); IV:  $37.85 \pm 1.07$  (30-42.5); V:  $35.71 \pm 0.76$  (30-40); VI:  $42.69 \pm 1.28$  (32.5-47.5); VII:  $36.69 \pm 0.68$  (32-40); VIII:  $29.80 \pm 1.11$  (22.5-35); IX:  $67.19 \pm 1.83$  (55-75)  $\mu\text{m}$ . Promediolaterals:  $22.5 \pm 2.77$  (17.5-27.5); Postmediolaterals:  $53.33 \pm 0.64$  (50-57.5)  $\mu\text{m}$  ( $n = 14$ ). The post-laterals and post-mediolaterals are serrate. There are 2 pairs of scapular setae placed on the interscutal membrane. Their measurements are Scapular I:  $23.33 \pm 1.66$  (15-30); Scapular II:  $26.07 \pm 0.92$  (22.5-30)  $\mu\text{m}$  (Figure 1a).

The chelicera has 1 tooth on the movable digit and 2 on the fixed digit (Figure 1b).

The fourth pair of legs have macroseta on the basitarsus of  $49.79 \pm 1.17$  (42.5-52.5)  $\mu\text{m}$  long (Figure 1c).

Ventrum: Peritreme extending to the verticals. Sternal, genital and ventrianal plates are found on the ventrum. The sternal plate has 3 pairs of sternal setae.

Besides these 2 pairs of small, distinct metapodal plates lie posterior of coxa IV. Metasternal plates are small and the cervix of the spermatheca is long and cup-shaped (Figure 2 a b).

The ventrianal plate is  $136.17 \pm 1.16$  (130-145)  $\mu\text{m}$  long and  $110.67 \pm 1.98$  (100-125)  $\mu\text{m}$  wide. There are 3 pairs of preanal setae placed on the anterior part of the plates and a pair of distinct, crescent-shaped pores close to each other. Three pairs of ventrolateral setae beside the ventrianal plate and the last one of ventrocaudal setae were  $52.27 \pm 0.62$  (50-55)  $\mu\text{m}$  long.

### Male

Dorsum: The chaetotaxy of the dorsal plate resembles that of the female. We obtained 2 specimens and their measurements are 300  $\mu\text{m}$  long and  $192.5 \pm 12.53$  (180-205)  $\mu\text{m}$  wide.

Ventrum: The spermatodactyl is r-shaped (Figure 2c). On the ventrianal plate, there are 3 pairs of ventrianal setae and a pair of crescent-shaped pores (Figure 2d). Ventrianal plate  $121.25 \pm 3.76$  (117.5-125)  $\mu\text{m}$  long;  $156.25 \pm 16.29$  (140-172.5)  $\mu\text{m}$  wide.

**Material examined:** On strawberry (28.02.2001) (18♀; 1♂); pepper (01.08.2003) (30♀); bean plants (01.08.2003) (11♀) and on peach trees (03.07.2003) (10♀), (01.08.2003) (27♀; 1♂).

*Amblyseius californicus* was firstly found on strawberry plants in Kuşadası, on the west coast of Turkey, associated with *T. urticae*. In subsequent surveys, it was found in the same area in peach orchards, associated with *P. ulmi*, and on pepper and bean plants, associated with *T. urticae*.

**Distribution:** Algeria (Athias-Henriot, 1959), California (Schuster and Pritchard, 1963), France (Raworth et al., 1994), Italy (Castagnoli and Simoni, 1999), Russia (Beglyarov, 1981), Spain (McMurtry, 1977), Argentina, Brazil, Chile, Guatemala, Japan, Peru, Uruguay and USA (Moreas and Mesa, 1988).

## Discussion

*Amblyseius californicus* is widely distributed in the Mediterranean region (Raworth et al., 1994; Castagnoli and Simoni, 1999; Griffiths, 1999). Athias-Henriot (1959) reported *A. californicus* from Algeria on a number of species of herbaceous plants including strawberry,



Figure 1. *Amblyseius californicus* (McGregor) Female: A) Dorsal view, B) Chelicera, C) Leg-4.

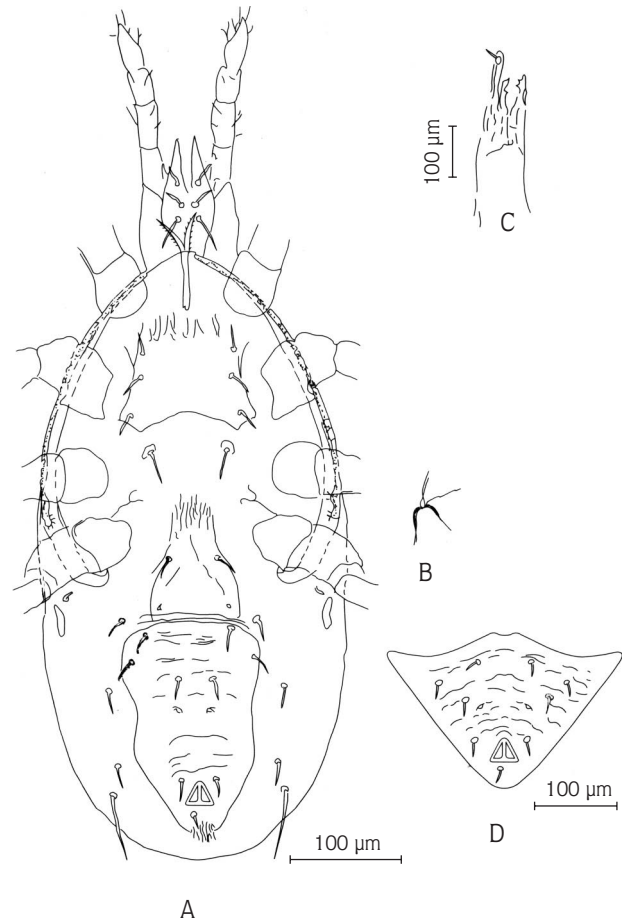


Figure 2. *Amblyseius californicus* (McGregor) Female: A) Ventral view, B) Spermatheca, Male: C) Spermatodactyl, D) Ventrianal plate

*Cynodon*, *Phaseolus*, *Plantago* and *Potentilla*. *A. californicus* was found on citrus and in pecan litter in California (Schuster and Pritchard, 1963). It was also found on citrus in Spain together with *T. cinnabarinus* and *Amblyseius stipulatus* (McMurtry, 1977). However, this predator was reported in apple and peach orchards from the south of France (Raworth et al., 1994).

*Amblyseius californicus* resembles *A. barkeri* (Hughes) and *A. bicaudus* (Wainstein). The shape of the spermatheca, and the presence and closeness of a pair of crescent-shaped pores on the ventrianal plate separate it from *A. barkeri* and *A. bicaudus* (Beglyarov, 1981). When the specimens obtained from Turkey were also compared to the specimen of the Koppert strain and the California population (Schuster and Pritchard, 1963), all the

measurements are in agreement with the samples from Turkey.

*Amblyseius californicus* is smaller, and does not suppress spider mite populations as quickly as *Phytoseiulus persimilis*. However, it is useful for controlling low populations of spider mites because it can survive longer in the absence of prey. It is also commercially available. A combination of *A. californicus* and *P. persimilis* showed a good potential for the biological control of spider mites in glasshouse crops (Schausberger and Walzer, 2001). Therefore, future experiments should study the potential of this species to control spider mites, either alone or in combination with other predatory mites from Turkey.

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