

Original article (Orijinal araştırma)

Mite species of the vegetable crops in Ordu Province with first report of *Amblyseius rademacheri* Dosse, 1958 (Mesostigmata: Phytoseiidae) in Turkey¹

Ordu ilinde sebzelerde bulunan akar türleri ile *Amblyseius rademacheri* Dosse, 1958 (Mesostigmata: Phytoseiidae)'nin Türkiye'de ilk kaydı

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Abstract

Turkey has suitable ecological conditions to grow a wide variety of vegetables. This research was conducted to investigate mite species on cultivated vegetables that include bean (*Phaseolus vulgaris* L., Fabaceae), corn (*Zea mays* L., Poaceae), cucumber (*Cucumis sativus* L., Cucurbitaceae), eggplant (*Solanum melongena* L., Solanaceae), leek (*Allium porrum* L., Alliaceae), lettuce (*Lactuca sativa* L., Asteraceae), onion (*Allium cepa* L., Alliaceae), pepper (*Capsicum annuum* L., Solanaceae), potato (*Solanum tuberosum* L., Solanaceae), radish (*Raphanus sativus* L., Brassicaceae), tomato (*Solanum lycopersicum* L., Solanaceae), watermelon (*Citrullus lanatus* (Thunb.) Matsum. & Nakai., Cucurbitaceae) and zucchini (*Cucurbita* sp., Cucurbitaceae) during 2013-2015 in Ordu Province in the Black Sea Region of Turkey. The samples were taken at weekly intervals from April to October each year. A total of 2030 mite specimens were collected and examined during the study. A total of 43 mite species belonging 15 families and 30 genera were identified. Among them, *Tetranychus urticae* Koch, 1836 (Prostigmata: Tetranychidae) was found to be the most common phytophagous mite, while *Amblyseius swirskii* Athias-Henriot, 1962 (Mesostigmata: Phytoseiidae) was the most abundant predator. In addition, *Amblyseius rademacheri* Dosse, 1958 (Mesostigmata: Phytoseiidae) was reported for the first time in Turkey. This new record redescribed and illustrated based on the specimens collected from *Solanum melongena* L. (Solanaceae). An identification key for the Turkish *Amblyseius* is also provided.

Keywords: Fauna, new record, phytophagous mites, predatory mites, survey, Turkey

Öz

Türkiye birçok sebze türünün yetişmesi için uygun ekolojik koşullara sahiptir. Bu çalışma 2013-2015 yılları arasında, Ordu ilinde yetiştirilen sebzelerden, fasulye (*Phaseolus vulgaris* L., Fabaceae), mısır (*Zea mays* L., Poaceae), hıyar (*Cucumis sativus* L., Cucurbitaceae), patlıcan (*Solanum melongena* L., Solanaceae), pırasa (*Allium porrum* L., Alliaceae), marul (*Lactuca sativa* L., Asteraceae), soğan (*Allium cepa* L., Alliaceae), biber (*Capsicum annuum* L., Solanaceae), patates (*Solanum tuberosum* L., Solanaceae), turp (*Raphanus sativus* L., Brassicaceae), domates (*Solanum lycopersicum* L., Solanaceae), karpuz (*Citrullus lanatus* (Thunb.) Matsum. & Nakai., Cucurbitaceae) ve kabak (*Cucurbita* sp., Cucurbitaceae) üzerinde bulunan akar türlerini belirlemek amacı ile yürütülmüştür. Örneklemeler her yılın nisan-kasım ayları arasında haftalık olarak yapılmıştır. Çalışma boyunca 2030 adet akar toplanmış ve incelenmiştir. Üç alt takıma bağlı 15 familya ve 30 cinsden toplam 43 akar türü saptanmıştır. Belirlenen akarlar arasında en yaygın bitki zararlısı tür, *Tetranychus urticae* Koch, 1836 (Prostigmata: Tetranychidae) iken en yaygın predator tür ise *Amblyseius swirskii* Athias-Henriot, 1962 (Mesostigmata: Phytoseiidae) olmuştur. Ayrıca çalışma da belirlenen *Amblyseius rademacheri* Dosse, 1958 (Mesostigmata: Phytoseiidae) türü, Türkiye predator akar faunası için yeni kayıt niteliğindedir. *Solanum melongena* L. (Solanaceae) üzerinden toplanan bu tür tanımlanarak çizimleri sunulmuştur. Ayrıca Türkiye'de tespit edilmiş *Amblyseius* cinsi akarlar için teşhis anahtarları da verilmiştir.

Anahtar sözcükler: Fauna, yeni kayıt, fitofag akarlar, predator akarlar, survey, Türkiye

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Introduction

Due to favorable ecological conditions, many vegetable species are grown in Turkey, with production totaling 30.8 Mt annually Turkey is the fourth largest vegetable producer in the world. In Ordu Province, vegetables are produced on about 1300 ha in both open fields and greenhouses. In addition, attempts have been made in Ordu to encourage the production of vegetables especially in greenhouses in recent years. As a result, the total greenhouse vegetable production has increased from 974 t in 2011 to 2,569 t in 2017 (TÜİK, 2017).

Vegetables are indispensable component of daily diet due to their nutritional benefits. They contain many nutrients such as potassium, fiber, folate and vitamins (Abak et al., 2010). However, some mite species such as *Tetranychus urticae* Koch, 1836 (Prostigmata: Tetranychidae) and *Aculops lycopersici* (Tryon, 1917) (Trombidiformes: Eriophyidae) are of important pests of vegetable crops causing significant reduction in both yield and quality (Karagöz, 2010). Consequently, there are many predatory mites, especially belonging to family phytoseiidae [e.g. *Amblyseius swirskii* Athias-Henriot, 1962, *Neoseiulus californicus* (McGregor, 1954), *Phytoseiulus persimilis* Athias-Henriot, 1957 (Mesostigmata: Phytoseiidae)], found in association with these phytophagous mites (Al-Atawi, 2011; Kade et al., 2011; Radonjic & Hrnčić, 2011; Binisha & Bhaskar, 2013; Şekeroğlu & Kazak, 1993).

A number of studies have been conducted on the mite species on vegetable crops in the different regions of Turkey. Soysal & Yayla (1988) identified *T. urticae* and *T. cinnabarinus* and their predator *Phytoseius finitimus* Ribaga, 1904 (Mesostigmata: Phytoseiidae) on eggplant in Antalya. In the same region, Çobanoğlu (1989a) determined seven phytoseiid species on vegetables. *Polyphagotarsonemus latus* (Banks) (Prostigmata: Tarsonemidae) has been reported on peppers in the Mediterranean Region (Yabaş & Ulubilir, 1995). Five phytophagous and three predatory mite species were determined in Şanlıurfa (Çıkman et al., 1996). Hıncal et al. (2002) identified *A. lycopersici* and its predator *Pronematus ubiqualis* (McGregor) (Trombidiformes: Tydeidae) on tomato in İzmir. *Phytoseiulus persimilis* was determined in many vegetables in southern Turkey (Şekeroğlu & Kazak, 1993) and cucumber greenhouses of the Samsun Province (Akyazı & Ecevit, 2008). Kılıç et al. (2012) found that the most common phytophagous species was *Rhizoglyphus robini* Claparede 1869 (Trombidiformes: Acaridae) and the most common predacious species was *Macrocheles merdarius* Berlese, 1889 (Trombidiformes: Macrochelidae) in fresh onion fields. Çobanoğlu & Kumral (2014) identified 34 mite species in tomato growing areas of Ankara, Bursa and Yalova Provinces.

However, so far, no studies have been conducted on the mite species on vegetable crops in Ordu Province. The aim of the study was to investigate the mite species on vegetable crops that are grown both in the open field and in greenhouses in Ordu Provinces between 2013 and 2015.

Material and Methods

Sampling

This study was conducted over the growing seasons in Ordu Province between 2013 and 2015. Samples were collected at 10-15 days intervals between April and November each year. Leaf samples were taken from 13 vegetable species, bean (*Phaseolus vulgaris* L., Fabaceae), corn (*Zea mays* L., Poaceae), cucumber (*Cucumis sativus* L., Cucurbitaceae), eggplant (*Solanum melongena* L., Solanaceae), leek (*Allium porrum* L., Alliaceae), lettuce (*Lactuca sativa* L., Asteraceae), onion (*Allium cepa* L., Alliaceae), pepper (*Capsicum annuum* L., Solanaceae), potato (*Solanum tuberosum* L., Solanaceae), radish (*Raphanus sativus* L., Brassicaceae), tomato (*Solanum lycopersicum* L., Solanaceae), watermelon (*Citrullus lanatus* (Thunb.) Matsum. & Nakai., Cucurbitaceae) and zucchini (*Cucurbita* sp., Cucurbitaceae). The samples were collected from 209 locations in 106 villages in 13 municipalities of Ordu Province (Figure 1). A total of 863 samples were collected; 794 in open fields and 69 in greenhouses (Table 1). The size of the sample varied according to the size of the sampling area and vegetable species; 25-30 leaf samples were taken from the large leafy vegetables such as *C. sativus* and *Cucurbita* sp., 10-20 leaf samples were collected from small leafy vegetables such as *P. vulgaris* and *S. lycopersicum* (Anonymous, 2008). Leaf samples were collected randomly from the lower, middle and upper parts of the plants. The samples were placed in paper bags. All bags were then packed in sealed plastic bags. The samples were kept in a refrigerator at 4°C (Toros, 1974; Madanlar, 1991).

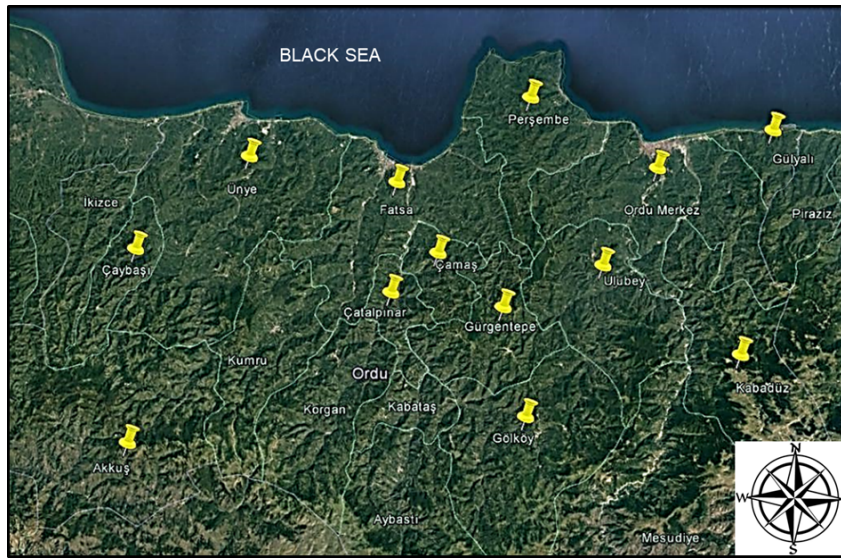


Figure 1. Municipalities sampled in Ordu Province in the Black Sea Region of Turkey (Adapted from www.google.com/maps).

Table 1. List of vegetable species sampled from open fields and greenhouses during growing season in 2013-2015 in 13 municipalities of Ordu Province, Turkey

Family	Vegetable species sampled Species	Number of samples	
		Open- field	Greenhouse
Fabaceae	<i>Phaseolus vulgareis</i> L.	175	10
Solanaceae	<i>Capsicum annum</i> L.	150	12
Cucurbitaceae	<i>Cucurbita</i> sp.	99	1
Solanaceae	<i>Solanum melonaena</i> L.	93	7
Solanaceae	<i>Solanum lycopersicum</i> L.	90	22
Poaceae	<i>Zea mays</i> L.	67	-
Cucurbitaceae	<i>Cucumis sativus</i> L.	62	17
Alliaceae	<i>Allium cepa</i> L.	23	-
Alliaceae	<i>Allium porrum</i> L.	16	-
Cucurbitaceae	<i>Citrullus lanatus</i> (Thunb.)	8	-
Asteraceae	<i>Lactuca sativa</i> L.	5	-
Brassicaceae	<i>Raphanus sativus</i> L.	3	-
Solanaceae	<i>Solanum tuberosum</i> L.	3	-
Total		794	69

Extraction, mounting and identification of mite specimens

Mites found on the adaxial and abaxial surfaces of the leaves were collected under a stereomicroscope (Leica S8 APO, Heerbrugg, Switzerland) with a fine sable-hair brush. Subsequently, the leaf samples were placed in a Tullgren funnel to extract the mites. All mites collected were preserved in 70% ethyl alcohol (Ecevit, 1976; Krantz & Walter, 2009). Mites, except eriophyoids, were cleared in lactophenol solution and mounted in Hoyer's medium (Krantz & Walter, 2009). The eriophyoid specimens were cleared in Keifer's booster medium and slides were mounted using "F" medium as suggested by Amrine & Manson (1996). The slides were dried in an oven at 50°C for 5-7 days.

Identification of mites at the species level was performed using the available taxonomic references such as Zhang (2000, 2003), Ueckermann (2013a) for Tarsonemidae; Pritchard & Baker (1955), Zhang et al. (2002), Zhang (2003), Seeman & Beard (2011), Ueckermann & Çobanoğlu (2012), Auger et al. (2013) for Tetranychidae; Edward & Donald (1987), Ueckermann & Çobanoğlu (2012), Çobanoğlu et al. (2016) for Tenuipalpidae; Muma & Denmark, (1970), Rowell et al. (1978), Çobanoğlu (1989a,b,c, 1993a,b,c,d), Faraji et al. (2007, 2011) for Phytoseiidae; Gonzalez-Rodríguez (1965), Fan & Zhang (2005) for Stigmaeidae; Fain et al. (1999), Yeşilayer & Çobanoğlu (2012) for Cheyletidae; Skvarla et al. (2014) for Cunaxidae; Solarz (2012) for Acaridae; Ripka et al. (2013), Ueckermann (2013b) for Iolinidae, Tydeidae and Triophtydeidae; Atyeo (1960) for Bdellidae. Mite species were identified under a light microscope (Leica DM 2500) equipped with phase contrast. The mite specimens were deposited in the Mite Collection at the Ordu University, Agricultural Faculty, Plant Protection Department, Ordu, Turkey.

Results and Discussion

A total of 43 mite species belonging to 15 families were identified (Table 2), with *Amblyseius rademacheri* Dosse, 1958 (Mesostigmata: Phytoseiidae) as a new record for Turkey. A total of 2030 mites were collected and identified during the study. Tetranychidae (1 species, 58%) is the most common family followed by Phytoseiidae (15 species 14.2%), Tarsonemidae (8 species, 11.3%), Iolinidae (2 species, 4.5%), Eriophyidae (1 species, 4.4%), Tydeidae (3 species, 0.9%), Tenuipalpidae (2 species, 1.2%), Stigmaeidae (1 species, 0.4%), Eupodidae (1 species, 0.3%), Acaridae (2 species, 0.2%), Erythraeidae (1 species, 0.1%), Trombididae (1 species, 0.1%), Triophtydeidae (2 species, 0.1%), Cheyletidae (2 species, 0.1%) and Bdellidae (1 species, 0.05%). The most common phytophagous species were *T. urticae* (58%), *P. latus* (9.4%) and *A. lycopersici* (4.4%). Among the predators, the most common species was *Homeopronematus staerki* (Schruft, 1972) (Trombidiformes: Iolinidae) (4.2%) followed by *A. swirskii* (3.6%) and *P. persimilis* (3.1%).

Table 2. Distribution of mite species on vegetable crops from the greenhouses and open fields in the Ordu Province between 2013 and 2015

Family	Species	Open field	Greenhouse	%	Pv	Ca	Cu	Sm	SI	Zm	Cs	Ac	Ap	Cl	Ls	Rs	St
	<i>Amblyseius andersoni</i>	6	1	0.3	+			*			+						
	<i>Amblyseius rademacheri</i>	2	-	0.1				+									
	<i>Amblyseius swirskii</i>	73	-	3.6	+	+	+	+			+						
	<i>Aristadromips masseei</i>	9	6	0.7			+				+						
	<i>Euseius finlandicus</i>	7	-	0.3	+	+					+						
	<i>Euseius gallicus</i>	20	-	1.0	+	+					+						
	<i>Kampimodromus aberrans</i>	2	-	0.1			+				+						
Phytoseiidae	<i>Neoseiulus barkeri</i>	7	1	0.4	+		+	+	+		*						
	<i>Neoseiulus bicaudus</i>	1	-	0.0										+			
	<i>Neoseiulus californicus</i>	2	15	0.8		*		+		+	*						
	<i>Phytoseius finitimus</i>	27	2	1.4	+	+	+	+	+		+						
	<i>Phytoseiulus persimilis</i>	46	17	3.1	+	*	+	+	+		+						
	<i>Proprioseiopsis okanagensis</i>	1	-	0.0			+										
	<i>Transeius wainsteini</i>	5	-	0.2		+	+				+						
	<i>Typhlodromus athiasae</i>	-	38	1.9		*					*						

Table 2. (Continued)

Family	Species	Open field	Greenhouse	%	Pv	Ca	Cu	Sm	Sl	Zm	Cs	Ac	Ap	Cl	Ls	Rs	St
Bdellidae	<i>Cyta</i> sp.	1	-	0.0				*									
Cheyletidae	<i>Cheletomimus berlesei</i>	1	-	0.0				+									
	<i>Cheletogenes ornatus</i>	1	-	0.0				+									
Eriophyidae	<i>Aculops lycopersici</i>	80	9	4.4					+								
Erythraeidae	<i>Abrolophus</i> sp.	3	-	0.1							+			+			
Eupodidae	<i>Eupodes</i> sp.	6	-	0.3			+										
Iolinidae	<i>Pronematus sextoni</i>	7	-	0.3	+	+		+			+						
	<i>Homeopronematus staerki</i>	78	7	4.2	+	+	+	+	+		+						
Stigmaeidae	<i>Zetzellia mali</i>	8	-	0.4	+		+	+	+								
	<i>Polyphagotarsonemus latus</i>	187	4	9.4	+	+	+	+	+	+	+						
	<i>Tarsonemus confusus</i>	16	2	0.9				*	+								
	<i>Tarsonemus waitei</i>	10	3	0.6			+		*		+	+					
	<i>Daidalotarsonemus</i> sp.	1	-	0.0			+										
	<i>Tarsonemus</i> sp. 1	2	-	0.1					+								
	<i>Tarsonemus</i> sp. 2	1	-	0.0				+									
	<i>Tarsonemus</i> sp. 3	1	-	0.0			+										
	<i>Xenotarsonemus</i> sp.	2	-	0.1			+										
Tetranychidae	<i>Tetranychus urticae</i> (GF)	938	239	58.	+	+	+	+	+	+	+	+	+		+	+	
	<i>Tetranychus urticae</i> (RF)	69	12	4.0	+			+	*	+	+						
Tenuipalpidae	<i>Brevipalpus lewisi</i>	12	-	0.6	+	+		+									
	<i>Brevipalpus obovatus</i>	12	-	0.6	+			+	+	+	+						
Triophtydeidae	<i>Triophtydeus immanis</i>	2	-	0.1					+								
	<i>Triophtydeus triophthalmus</i>	1	-	0.0	+												
Trombidiidae	<i>Allothrombium pulvinum</i>	3	-	0.1	+	+		+									
	<i>Brachytydeus mali</i>	2	-	0.1	+	+											
Tydeidae	<i>Tydeus californicus</i>	2	-	0.1		+											
	<i>Tydeus goetzi</i>	15	-	0.7	+	+	+	+			+						
Acaridae	<i>Tyrophagus palmarum</i>	2	-	0.1						+	+						
	<i>Tyrophagus putrescentiae</i>	3	-	0.1	+			+									
TOTAL		1674	356		18	19	17	22	13	5	21	3	1	1	1	1	-

%; percentage in total mites; GF: green form; RF: red form; +: open field, *: greenhouse; Pv: *Phaseolus vulgaris*, Ca: *Capsicum annum*, Sm: *Solanum melongena*, Cu: *Cucurbita* sp., Sl: *Solanum lycopersicum*, Zm: *Zea mays*, Cs: *Cucumis sativus*, Ap: *Allium porrum*, Ac: *Allium cepa*, Ls: *Lactuca sativa*, Cl: *Citrullus lanatus*, Rs: *Raphanus sativus*, St: *Solanum tuberosum*

Tetranychidae

Tetranychus urticae Koch, 1836

Open field green form:

Material examined: Akkuş, 15.09.2014, *P. vulgaris* (19♀♀, 12♂♂), *Cucurbita* sp. (11♀♀), *S. lycopersicum* (2♀♀); Çamaş, 21.08.2014, *Z. mays* (1♀), 05.08.2014, *P. vulgaris* (8♀♀), *S. melongena* (3♀♀), *C. sativus* (2♀♀),

Z. mays (4♀♀); Çatalpınar, 05.08.2014, *P. vulgaris* (5♀♀), 21.08.2014, *P. vulgaris* (24♀♀, 15♂♂), *Cucurbita* sp. (3♀♀, 1♂), *S. melongena* (9♀♀, 3♂♂), *C. sativus* (3♀♀, 6♂♂), *C. annuum* (3♀♀), *Z. mays* (3♀♀, 3♂♂); Çaybaşı, 10.10.2014, *P. vulgaris* (6♀♀, 4♂♂), *S. melongena* (3♀♀), *C. sativus* (5♀♀), *C. annuum* (1♀); Fatsa, 13.09.2013, *P. vulgaris* (21♀♀, 1♂), *Cucurbita* sp. (5♀♀), *S. melongena* (21♀♀, 1♂), *C. sativus* (2♀♀), *L. sativa* (1♀, 1♂), *R. sativus* (2♀♀), 28.08.2014, *P. vulgaris* (14♀♀, 2♂♂), *Cucurbita* sp. (8♀♀, 2♂♂), *S. lycopersicum* (7♀♀, 1♂), *C. sativus* (2♀♀), *S. melongena* (15♀♀, 2♂♂), *Z. mays* (7♀♀, 1♂); Gökçöy, 14.07.2013, *P. vulgaris* (7♀♀), *Cucurbita* sp. (3♀♀), *L. sativa* (1♀); Gülyalı, 27.06.2013, *P. vulgaris* (4♀♀), *Cucurbita* sp. (1♂), *S. lycopersicum* (2♀♀, 1♂), *S. melongena* (16♀♀, 2♂♂), *C. sativus* (10♀♀), *C. annuum* (1♀), *Z. mays* (1♀); Gürgentepe, 02.10.2014, *P. vulgaris* (43♀♀, 22♂♂), *Cucurbita* sp. (15♀♀, 1♂), *S. melongena* (11♀♀, 1♂), *C. sativus* (3♀♀, 1♂), *C. annuum* (6♀♀, 3♂♂); Kabadüz, 26.09.2014, *P. vulgaris* (37♀♀, 17♂♂), *Cucurbita* sp. (12♀♀), *S. melongena* (13♀♀), *C. sativus* (18♀♀, 2♂♂), *C. annuum* (1♀); Altınordu, 20.07.2013, *P. vulgaris* (17♀♀, 6♂♂), *Cucurbita* sp. (6♀♀, 2♂♂), *S. melongena* (15♀♀, 1♂), *C. sativus* (20♀♀, 1♂), *Z. mays* (2♀♀, 1♂), *A. porrum* (1♀), 23.08.2013, *P. vulgaris* (20♀♀), *Cucurbita* sp. (8♀♀), *S. melongena* (7♀♀), *C. sativus* (1♀), *C. annuum* (1♀), *Z. mays* (1♀); Perşembe, 23.07.2013, *C. sativus* (13♀♀), 27.09.2013, *P. vulgaris* (8♀♀), *Cucurbita* sp. (18♀♀, 1♂), *S. melongena* (7♀♀), *C. sativus* (10♀♀), *C. annuum* (1♀), 07.08.2014, *P. vulgaris* (6♀♀, 2♂♂), *Cucurbita* sp. (1♀, 1♂), *S. melongena* (6♀♀), *C. annuum* (6♀♀, 1♂), *Z. mays* (1♀); Ulubey, 14.07.2013, *P. vulgaris* (1♀), *Cucurbita* sp. (3♀♀), 06.09.2013, *P. vulgaris* (21♀♀, 5♂♂), *Cucurbita* sp. (17♀♀, 2♂♂), *S. lycopersicum* (1♀), *S. melongena* (11♀♀, 7♂♂), *C. sativus* (21♀♀), *C. annuum* (5♀♀), *Z. mays* (1♀), 11.09.2014, *P. vulgaris* (15♀♀, 4♂♂), *S. melongena* (8♀♀), *C. sativus* (9♀♀), *C. annuum* (1♀); Ünye, 26.07.2013, *P. vulgaris* (11♀♀), *Cucurbita* sp. (8♀♀), *S. lycopersicum* (2♀♀), *S. melongena* (2♀♀), *C. sativus* (1♀), *C. annuum* (1♀), *A. porrum* (1♀), 07.08.2014, *P. vulgaris* (18♀♀, 3♂♂), *Cucurbita* sp. (8♀♀, 1♂), *S. lycopersicum* (2♀♀), *S. melongena* (7♀♀, 1♂), *C. sativus* (1♀), *Z. mays* (4♀♀), *A. cepa* (1♀), *A. porrum* (2♀♀, 1♂).

Open field red form:

Material examined: Akkuş, 15.09.2014, *P. vulgaris* (1♂); Çamaş, 05.08.2014, *P. vulgaris* (5♀♀, 1♂), *C. sativus* (2♀♀, 2♂♂), *Z. mays* (11♀♀, 1♂); Çatalpınar, 21.08.2014, *P. vulgaris* (4♂♂); Çaybaşı, 10.10.2014, *P. vulgaris* (6♀♀, 2♂♂); Fatsa, 28.08.2014, *C. sativus* (3♀♀, 2♂♂); Gürgentepe, 02.10.2014, *P. vulgaris* (2♂♂), *S. melongena* (1♂); Kabadüz, 26.09.2014, *P. vulgaris* (5♀♀, 5♂♂); Ünye, 07.08.2014, *P. vulgaris* (10♀♀, 4♂♂).

Greenhouse green form:

Material examined: Çaybaşı, 10.10.2014, *C. sativus* (3♀♀), *C. annuum* (1♀); Fatsa, 13.09.2013, *P. vulgaris* (8♀♀, 2♂♂), *S. lycopersicum* (1♀), *S. melongena* (1♀, 1♂), *C. annuum* (1♀), 28.08.2014, *C. sativus* (2♀♀, 2♂♂); Gülyalı, 27.06.2013, *P. vulgaris* (23♀♀), *C. sativus* (15♀♀), *S. lycopersicum* (1♀); Gürgentepe, 02.10.2014, *P. vulgaris* (13♀♀, 8♂♂), *C. annuum* (7♀♀, 2♂♂), *C. sativus* (3♀♀, 1♂); Altınordu, 23.08.2013, *C. sativus* (5♀♀, 1♂); Perşembe, 23.07.2013, *P. vulgaris* (21♀♀, 2♂♂), *C. sativus* (17♀♀, 1♂), *S. lycopersicum* (3♀♀); Ulubey, 11.09.2014, *C. sativus* (2♀♀); Ünye, 26.07.2013, *C. sativus* (30♀♀, 2♂♂), *S. melongena* (33♀♀, 1♂), *S. lycopersicum* (13♀♀), 07.08.2014, *C. sativus* (10♀♀), *S. lycopersicum* (3♀♀).

Greenhouse red form:

Material examined: Gürgentepe, 02.10.2014, *P. vulgaris* (1♀); Ünye, 07.08.2014, *S. lycopersicum* (2♀♀, 1♂), *S. melongena* (7♀♀, 1♂).

Distribution: *T. urticae* is a cosmopolitan polyphagous mite species (Migeon et al., 2011). In previous studies, it was commonly found on crops in Turkey (Öngören et al., 1975; Soysal & Yayla, 1988; Güven & Madanlar, 2000; Tokkamış & Yanar, 2011; Çobanoğlu & Kumral, 2014, 2016; Akyazı et al., 2017; İnak & Çobanoğlu, 2018).

Tenuipalpidae

Brevipalpus obovatus Donnadieu, 1875

Material examined (open field): Çamaş, 05.08.2014, *P. vulgaris* (1♀); Gülyalı, 19.08.2015, *S. lycopersicum* (1pn), *C. sativus* (1♀); Kabadüz, 26.08.2014, *S. melongena* (1♀); Altınordu, 29.08.2013, *S. melongena* (1♀, 3pn); Perşembe, 27.09.2013, *S. melongena* (2♀♀), *Z. mays* (1♀); Ulubey, 06.09.2013, *C. sativus* (1pn).

Distribution: *B. obovatus* has been found on many types of plants worldwide (Beard et al., 2012). In Turkey, this species was determined for the first time on lemon trees (Düzgüneş, 1952), and subsequently in various localities in Turkey (Çobanoğlu et al., 2016).

***Brevipalpus lewisi* McGregor, 1949**

Material examined (open field): Fatsa, 28.08.2014, *S. melongena* (1♀); Perşembe, 27.09.2013, *P. vulgaris* (1♀, 1pn), *S. melongena* (1♀), *C. annuum* (5♀♀).

Distribution: *B. lewisi* occurs on many plant groups around the world and Turkey (Jeppson et al., 1975; Soylu & Ürel, 1977; Ghai & Shenhmar, 1984; Göven et al., 2009; Khanjani et al., 2013; Yanar & Erdoğan, 2013; Çobanoğlu et al., 2016; Ueckermann & Ripka, 2016; Ueckermann et al., 2018).

Tarsonemidae

***Polyphagotarsonemus latus* (Banks)**

Material examined (open field): Çamaş, 05.08.2014, *P. vulgaris* (4♀♀), *C. sativus* (2♀♀, 1♂); Çatalpınar, 21.08.2014, *P. vulgaris* (4♀♀, 3♂♂), *Cucurbita* sp. (1♂), *C. annuum* (2♀♀); Fatsa, 13.09.2013, *P. vulgaris* (9♀♀), *C. annuum* (2♀♀); Gürgentepe, 02.10.2014, *P. vulgaris* (1♀); Kabadüz, 26.09.2014, *P. vulgaris* (1♀), *Cucurbita* sp. (8♀♀, 1♂), *S. melongena* (14♀♀), *C. annuum* (1♀); Altınordu, 20.07.2013, *P. vulgaris* (11♀♀, 3♂♂), *S. lycopersicum* (1♀), 23.08.2013, *P. vulgaris* (19♀♀, 4♂♂), *C. annuum* (11♀♀, 1♂), *S. melongena* (1♀); Perşembe, 23.07.2013, *P. vulgaris* (7♀♀, 1♂), *C. annuum* (3♀♀, 2♂♂); Ulubey, 06.09.2013, *P. vulgaris* (43♀♀, 2♂♂), *Cucurbita* sp. (3♀♀), *C. annuum* (13♀♀, 1♂), *Z. mays* (1♀); Ünye, 07.08.2014, *P. vulgaris* (5♀♀, 3♂♂), *C. annuum* (1♀).

Material examined (greenhouse): Fatsa, 13.09.2013, *P. vulgaris* (4♀♀).

Distribution: *P. latus* is a very common species around the world (Binisha & Bhaskar 2013; CABI, 2014). In Turkey, it has been recorded in association with several vegetable crops (Çobanoğlu, 1995; Tunç & Göçmen, 1995; Yabaş & Ulubilir, 1995; Bulut, 1999; Can & Çobanoğlu, 2010).

***Daidalotarsonemus* sp. De Leon, 1956**

Material examined (open field): Çatalpınar, 21.08.2014, *Cucurbita* sp. (1♀).

***Tarsonemus waitei* Banks, 1912**

Material examined (open field): Fatsa, 13.09.2013, *Cucurbita* sp. (7♀♀), *C. sativus* (2♀♀); Ünye, 26.07.2013, *A. cepa* (1♀).

Material examined (greenhouse): Fatsa, 13.09.2013, *S. lycopersicum* (1♀); Ulubey, 06.09.2013, *S. lycopersicum* (2♀♀).

Distribution: *T. waitei* previously recorded in Brazil, Canada, China, Congo, Costa Rica, Hungary, New Zealand, Poland, Portugal and Ukraine (Lin & Zhang, 2002; Ripka et al., 2005). It has also been found in Turkey (Çobanoğlu, 1995; Tokkamış, 2011).

***Tarsonemus confusus* Ewing, 1939**

Material examined (open field): Gürgentepe, 20.10.2014, *S. lycopersicum* (15♀♀, 1♂).

Material examined (greenhouse): Fatsa, 28.08.2014, *S. melongena* (1♀); Ulubey, 06.09.2013, *S. lycopersicum* (1♀).

Distribution: *T. confusus* was reported in the USA, Canada, Italy, Ireland, Germany, Poland, Ukraine, Russia, Japan, Korea, China, Egypt by Lin & Zhang (2002) and Hungary by Ripka et al. (2005). In Turkey, it was first identified on *Pyracantha coccinea* Roem (Rosaceae) in Edime by Çobanoğlu (1995). *C. annuum*, *C. sativus* (Tokkamış, 2011) and *S. lycopersicum* (Çobanoğlu & Kumral, 2014) are among the hosts of *T. confusus*.

***Xenotarsonemus* sp.**

Material examined (open field): Gülyalı, 10.08.2015, *C. annuum* (2♀♀).

***Tarsonemus* sp. 1**

Material examined (open field): Gürgentepe, 20.10.2014, *S. lycopersicum* (1♀); Kabadüz, 26.09.2014, *S. lycopersicum* (1♀).

***Tarsonemus* sp. 2**

Material examined (open field): Gülyalı, 10.07.2013, *S. melongena* (1♀).

***Tarsonemus* sp. 3**

Material examined (open field): Fatsa, 28.08.2014, *Cucurbita* sp. (1♀).

Eriophyidae

***Aculops lycopersici* (Tryon, 1917)**

Material examined (open field): Çatalpınar, 05.08.2014, *S. lycopersicum* (10♀♀); Fatsa, 13.09.2013, *S. lycopersicum* (9♀♀); Kabadüz, 26.09.2014, *S. lycopersicum* (4♀♀); Altınordu, 20.07.2013, *S. lycopersicum* (26♀♀), 23.08.2013, *S. lycopersicum* (3♀♀); Perşembe, 27.09.2013, *S. lycopersicum* (13♀♀); Ulubey, 06.09.2013, *S. lycopersicum* (7♀♀); Ünye, 07.08.2014, *S. lycopersicum* (8♀♀).

Material examined (greenhouse): Fatsa, 13.09.2013, *S. lycopersicum* (9♀♀).

Distribution: *A. lycopersici* is widespread worldwide (Denizhan et al., 2015). It has also been recorded in association with tomato plants in many localities in Turkey (Şekeroğlu & Özgür, 1984; Madanlar & Öncüer, 1994; İnal, 2005; Yanar et al., 2008; Can & Çobanoğlu, 2010; Çobanoğlu & Kumral, 2014; Denizhan et al., 2015).

Tydeidae

***Brachytydeus mali* (Oudemans, 1929)**

Material examined (open field): Çatalpınar, 21.08.2014, *P. vulgaris* (1♀); Gülyalı, 19.08.2015, *C. annuum* (1♀).

Distribution: *B. mali* was collected in Scotland (Baker & Wharton, 1952), Serbia (Stojnic et al., 2002), Iran (Jalilrad et al., 2012), Spain and Greece (Anonymous, 2015). It was reported in Turkey (Istanbul) by Yeşilayer (2009).

***Tydeus californicus* (Banks, 1904)**

Material examined (open field): Akkuş, 15.09.2014, *C. annuum* (1♀); Perşembe, 13.09.2013, *C. annuum* (1♀).

Distribution: *T. californicus* is very common around the world (Tempfli et al., 2015). The first record of *T. californicus* in Turkey was on citrus leaves in Adana (Düzgüneş, 1963).

***Tydeus goetzi* Schruft, 1972**

Material examined (open field): Akkuş, 15.09.2014, *C. annuum* (1♀); Gülyalı, 27.06.2013, *C. sativus* (1♀), 10.07.2013, *P. vulgaris* (2♀♀), *C. annuum* (2♀♀); Perşembe, 27.09.2013, *P. vulgaris* (1♀), *C. annuum* (2♀♀), 09.07.2014, *Cucurbita* sp. (1♀); Altınordu, 20.07.2013, *P. vulgaris* (2♀♀), *C. sativus* (2♀♀), *S. melongena* (1♀).

Distribution: *T. goetzi* is a rare species. This mite has been determined only in Germany (Schruft, 1972), France (Andre, 2011) and Turkey (Akyazı et al., 2017).

Triophyteidae***Triophthalmus triophthalmus* (Oudemans, 1929)**

Material examined (open field): Ulubey, 11.09.2014, *P. vulgaris* (1♀).

Distribution: *T. triophthalmus* has been reported from Italy (Sabbatini Peverieri et al., 2009), Ukraine (Ripka et al., 2005), Turkey (Özman-Sullivan et al., 2005), Germany and Sweden (Tempfli et al., 2015). However, the feeding habits of *T. triophthalmus* is contradictory (Tempfli et al., 2015).

***Triophyteus immanis* Kuznetsov, 1973**

Material examined (open field): Altınordu, 21.07.2013, *S. lycopersicum* (1♀), 23.08.2013, *S. lycopersicum* (1♀).

Distribution: *T. immanis* has been reported from South Africa (Ueckermann & Grout, 2007), Turkey (Özman-Sullivan et al., 2005) and Hungary (Ripka et al., 2002, 2005).

Iolinidae***Homepronematus staerki* (Schruff, 1972)**

Material examined (open field): Akkuş, 15.09.2014, *P. vulgaris* (1♀), *C. annuum* (7♀♀); Çamaş, 05.08.2014, *P. vulgaris* (2♀♀), *Cucurbita* sp. (1♀); Çatalpınar, 21.08.2014, *S. lycopersicum* (2♀♀); Fatsa, 13.09.2013, *P. vulgaris* (2♀♀), *Cucurbita* sp. (3♀♀), *C. annuum* (1♀); Gülyalı, 10.07.2013, *P. vulgaris* (2♀♀); Gürgentepe, 02.10.2014, *P. vulgaris* (6♀♀); Kabadüz, 26.09.2014, *P. vulgaris* (3♀♀, 1tn), *S. lycopersicum* (7♀♀), *S. melongena* (2♀♀); Altınordu, 20.07.2013, *P. vulgaris* (3♀♀), *S. lycopersicum* (5♀♀), *C. sativus* (1♀), 23.08.2013, *P. vulgaris* (5♀♀), *S. lycopersicum* (1♀); Perşembe, 23.07.2013, *S. lycopersicum* (2♀♀), 27.09.2013, *S. lycopersicum* (4♀♀), *C. annuum* (2♀♀), 09.07.2014, *P. vulgaris* (1♀); Ulubey, 14.07.2013, *P. vulgaris* (2♀♀), 06.09.2014, *P. vulgaris* (5♀♀), *C. sativus* (1♀), *S. melongena* (1♀); Ünye, 26.07.2013, *P. vulgaris* (3♀♀), 07.08.2014, *P. vulgaris* (2♀♀).

Material examined (greenhouse): Perşembe, 23.07.2013, *P. vulgaris* (1♀), *S. lycopersicum* (3♀♀); Ünye, 26.07.2013, *C. annuum* (2♀♀); Fatsa, 13.09.2013, *S. melongena* (1♀).

Distribution: *H. staerki* has been reported in Serbia (Stojnic et al., 2002), Germany (Schruff, 2006), Hungary (Ripka et al., 2005, 2013; Tempfli et al., 2015). Özman-Sullivan et al. (2005) recorded *H. staerki* on hazelnut in Turkey.

***Pronematus sextoni* Baker, 1968**

Material examined (open field): Fatsa, 13.09.2013, *P. vulgaris* (3♀♀); Altınordu, 23.08.2013, *S. melongena* (1♀), *C. annuum* (1♀); Ulubey, 06.09.2013, *C. sativus* (1tn), *C. annuum* (1♀).

Distribution: *P. sextoni* has been found in India (Gupta, 1985), Africa (Gupta et al., 2015) and Turkey (Çobanoğlu & Kazmierski, 1999).

Cheyletidae***Cheletomimus berlesei* (Oudemans)**

Material examined (open field): Altınordu, 23.08.2013, *S. melongena* (1♀).

Distribution: *C. berlesei* has been reported from America, France, Italy, Israel and New Zealand (Summers & Price, 1970). In Turkey, it was first identified in Istanbul by Yeşilayer & Çobanoğlu (2012) and it was found in association with *Cenopalpus lineola* Canestrini & Fanzago (an ornamental plant). During this study, it was collected with *T. urticae*, *P. latus* and *P. sextoni* on *S. melongena*.

***Cheletogenes ornatus* (Canesterini & Fanzago, 1876)**

Material examined (open field): Perşembe, 09.07.2014, *S. melongena* (1♀).

Distribution: This mite is found in Southern Europe, South Africa, Italy, Israel, China, Australia and America (Volgin, 1989). *C. ornatus* was reported by Düzgüneş (1963) on lemon trees in Antalya, Turkey. In this study, it was found together with *T. urticae* on *S. melongena*.

Stigmaeidae

***Zetzellia mali* (Ewing)**

Material examined (open field): Akkuş, 15.09.2014, *P. vulgaris* (1♀); Gürgentepe, 02.10.2014, *S. melongena* (1♀); Altınordu, 20.07.2013, *S. lycopersicum* (2♀♀), 21.07.2015, *Cucurbita* sp. (1♀); Perşembe, 27.09.2013, *S. melongena* (2♀♀); Ünye, 07.08.2014, *P. vulgaris* (1♀).

Distribution: *Z. mali* has an extensive worldwide range (Gerson et al., 2003). It has been widely found in many provinces in Turkey by many researchers (Düzgüneş, 1963; Akyazı & Ecevit, 2003; Çobanoğlu et al., 2003; İnal, 2005; Kumral, 2005; Kasap & Çobanoğlu, 2007; Denizhan & Çobanoğlu, 2009; Yeşilayer, 2009; Karagöz, 2010; Sağlam & Çobanoğlu, 2010; Dönel & Doğan, 2013; Çobanoğlu & Kumral, 2014; Kumral & Çobanoğlu, 2015b; Akyazı et al., 2016a, 2017; İnak & Çobanoğlu, 2018). During this study, it was collected together with *T. urticae*, *H. staerki* and *A. lycopersici* on *P. vulgaris*.

Eupodidae

***Eupodes* sp.**

Material examined (open field): Ulubey, 11.09.2014, *Cucurbita* sp. (3♀♀); Gürgentepe, 02.10.2014, *Cucurbita* sp. (2♀♀); Gülyalı, 27.06.2013, *Cucurbita* sp. (1♀).

Bdellidae

***Cyta* sp.**

Material examined (greenhouse): Fatsa, 28.08.2014, *S. melongena* (1♀).

Trombidiidae

***Allothrombium pulvinum* Ewing, 1917**

Material examined (open field): Kabadüz, 26.07.2013, *S. melongena*, (1dn), 26.09.2014, *P. vulgaris* (1♂), *C. annuum* (1♂).

Distribution: *A. pulvinum* was first discovered in North America by Ewing (1917). Later, it was determined in North America, Europe and Asia (Zhang & Norbakhsh, 1995). It has also been reported in Turkey (Çobanoğlu et al., 2003; Yeşilayer, 2009).

Erythraeidae

***Abrolophus* sp.**

Material examined (open field): Ünye, 07.08.2014, *C. sativus* (1♀), *C. lanatus* (1♀).

Material examined (greenhouse): Fatsa, 13.09.2013, *C. sativus* (1♀).

Distribution: In Turkey, *Abrolophus* sp. was identified in Bursa (Kumral, 2005), İzmir (Kılıç et al., 2012) and Ankara (Kumral & Çobanoğlu, 2015a).

Acaridae***Tyrophagus putrescentiae* (Schrank, 1781)**

Material examined (open field): Çatalpınar, 21.08.2014, *P. vulgaris* (1♀); Altınordu, 20.07.2013, *S. melongena* (1tn); Perşembe, 27.09.2013, *P. vulgaris* (1♂).

Distribution: The cosmopolitan *T. putrescentiae* has been found in New Zealand, Australia, China, Ecuador, Germany, Japan, the Netherlands and the USA (Fan & Zhang, 2007). In Turkey, this species was collected from vegetables including *C. annuum*, *C. sativus* (Tokkemiş & Yanar, 2011), *A. cepa* (Kılıç et al., 2012), *S. lycopersicum* (Çobanoğlu & Kumral, 2014).

***Tyrophagus palmarum* (Oudemans, 1924)**

Material examined (open field): Çatalpınar, 21.08.2014, *Z. mays* (1♀), Ulubey, 06.09.2013, *C. sativus* (1♀).

Distribution: *T. palmarum* has been reported from Czechoslovakia (Zdarkova, 1967), Germany (Franz et al., 1997), Australia, Netherland, Tuvalu and New Zealand (Fan & Zhang, 2007). It was detected for the first time in Turkey in dust samples taken from the homes of allergic asthmatic patients in Samsun Province of Turkey by Çelik (2009).

Phytoseiidae

Key to species of the genus *Amblyseius* Berlese in Turkey based on adult females (based on Faraji et al., 2011; Akyazı et al., 2016b)

1. Ventrianal shield vase-shaped. 2
—Ventrianal shield not vase-shaped. 3
2. Calyx of spermatheca tubular. *A. largoensis* (Muma, 1955)
—Calyx of spermatheca fundibular. *A. herbicolus* (Chant, 1959)
3. Seta Z5 longer than width of dorsal shield; spermatheca with calyx annulated, flared distally.
. *A. obtusus* (Koch, 1839)
—Seta Z5 shorter than width of dorsal shield; spermatheca with calyx not annulated. 4
4. Ventrianal shield with large elliptical (crescent shaped) preanal solenostomes. 5
—Ventrianal shield with small round preanal solenostomes. 8
5. Dorsal shield reticulated. 6
—Dorsal shield smooth. 7
6. Fixed digit with 10 teeth; Gell with 8 setae. *A. bryophilus* Karg, 1970
—Fixed digit with 7-8 teeth; Gell with 7 setae. *A. rademacheri* Dosse, 1958
7. Seta Z5 102-116 long; atrium of spermatheca relatively long; StilV at most reaching the insertion of StilV. *A. swirskii* Athias-Henriot, 1962
—Seta Z5 longer than 150; atrium of spermatheca short and c-shaped; StilV passing well behind the insertion of StilV. *A. andersoni* (Chant, 1957)
8. Seta Z4 almost reaching insertion of seta S4. *A. armeniacus* Arutunjan and Ohandjanian, 1972
—Seta Z4 short, less than 1/3 of distance between setae Z4 and S4. *A. kadhajai* Gomelauri, 1968

***Amblyseius andersoni* (Chant, 1957)**

Material examined (open field): Perşembe, 23.07.2013, *C. sativus* (2♀♀), 27.09.2013, *C. annuum* (3♀♀, 1♂).

Material examined (greenhouse): Fatsa, 13.09.2013, *S. melongena* (1♀).

Distribution: *A. andersoni* is a very common predatory mite with a worldwide distribution (Demite et al., 2017). It has been reported together with various mite species by many researchers in Turkey (Faraji et al., 2011). In this study, it was collected with *B. lewisi*, *T. urticae* and *H. staerki* from *C. annuum* and *C. sativus* leaves in the open fields and with *T. urticae* and *H. staerki* on *S. melongena* in the greenhouses.

***Amblyseius rademacheri* Dosse, 1958**

Senior synonym: *Amblyseius khnzoriani* Wainstein & Arutunjan (Wainstein, 1975)

Material examined (open field): Ulubey, 11.09.2014, *S. melongena* (2♀♀).

Description (n = 2)

Dorsum (Figure 2A) - Dorsal shield elongate, strongly reticulated; length (j1-J5) 343-345; width (s4-s4) 165-167; seven pairs of solenostomes (gd1, gd2, gd4, gd5, gd6, gd8, gd9); 17 pairs of setae. Dorsal setae, short and minute regular, except for j1, j3, s4, Z4 and Z5. Z4 and Z5 strongly serrated. Peritremes extending beyond bases of setae j1 (Figure 2A).

Measurements of dorsal setae - j1 22-24, j3 33-35, j4 5-6, j5 4, j6 8-9, J2 9, J5 8, z2 12-13, z4 14, z5 6, Z1 9, Z4 86-89, Z5 108-109, s4 65-68, S2 11, S4 9, S5 8-9, r3 12-14, R1 8-9.

Venter (Figure 2B) - Sternal shield reticulated; length (ST1-ST3) 65-67; width (ST2-ST2) 66-68; two pairs of solenostomes (pst1-pst2); threepairs of setae (ST1, ST2 and ST3). Metasternal shield is located separately and bearing ST4. Genital shield length 76 (ST5-ST5). Ventrianal shield slightly reticulated; length 108-109, width (ZV2-ZV2) 98-105; three pairs of preanal setae (JV1, JV2 and ZV2); one pairs of crescentic solenostomes (gv3) located between setae JV2. Additionally, setae ZV1, ZV3, - JV4 and JV5 surrounding ventrianal shield. Setae JV5 smooth, 50 in length.

Spermatheca (Figure 3A) - Calyx cup shaped; atrium C-like.

Chelicerae (Figure 3B) - Fixed digit of chelicerae with seven teeth and movable digit with two teeth, both 30-31 long.

Legs (Figure 3C) - Length of legs as follows: legI 341-358, legII 275-296, legIII 299-303 and leg IV 405-411. Three macrosetae on Leg IV (SgelIV 58-59, StilIV 39-40, StIV 82). Leg I, II and III with one macrosetae on genu (Sgel 26-34, Sgell 30-32, Sgelll 34).

Male - Not found in this study.

Remarks: In previous studies, seven species belonging to the genus *Amblyseius* (Faraji et al., 2011; Döker et al., 2014a; Akyazı et al., 2016b) were recorded for the Turkish fauna. Here, *Amblyseius rademacheri* is reported for the first time in Turkey.

Based on the female specimens, *A. rademacheri* is similar *Amblyseius bryophilus* Karg. However, it differs from the latter in having seven setae on genu II. *A. bryophilus* has 8 setae on genu II.

Amblyseius rademacheri is also similar to *A. swirskii*. However, it differs from the latter by having dorsal shield strongly reticulated, setae Z4 and Z5 long and serrate and two teeth on movable digit of chelicerae. Dorsal shield of *A. swirskii* is smooth, setae Z4 and Z5 slender and lightly serrate and three teeth on movable digit of chelicerae. Additionally, setae S2 of *A. rademacheri* are 11 µm long while in that of *A. swirskii* approximately twice as long.

Amblyseius rademacheri was found together with *T. urticae* on *S. melongena* in this study. In previous studies, it was found on various fruits, weeds, forest trees in association with tetranychid and eriophid mites (Hajizadeh, 2007). Tixier et al. (2013) also reported *A. rademacheri* on *Vitis vinifera* L. (Vitaceae). Komi et al. (2008), found this species on pepper and eggplant in Japan.

Distribution: *A. rademacheri* has been recorded in Armenia, Austria, Azerbaijan, China-Jiangxi, Czech Republic, Denmark, Georgia, Germany, Hungary, Iran, Italy, Japan, Latvia, Moldova, Netherlands, Poland, Russia-Moscow Province, Primorsky Territory; Yaroslavl Province; Slovakia, Slovenia, South Korea, Spain, Switzerland, Ukraine (Demite et al., 2017) and Turkey (this study).

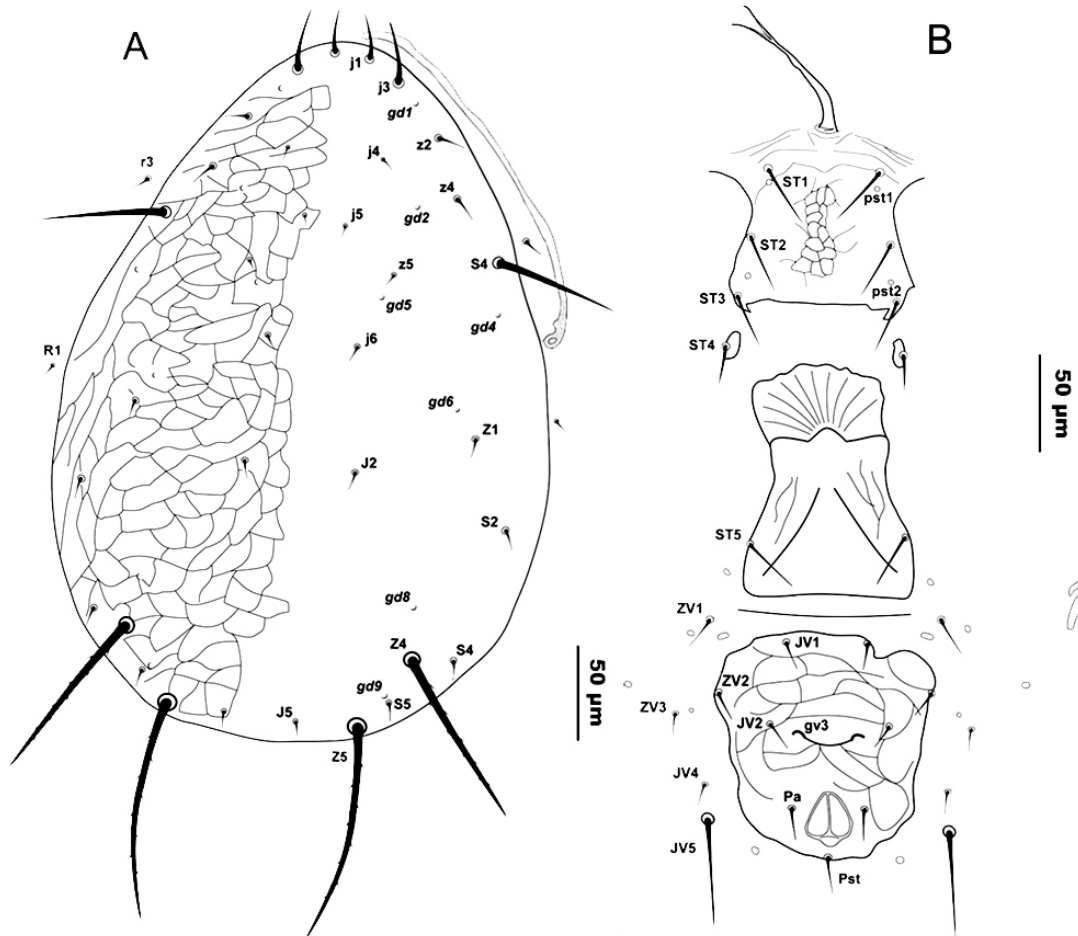


Figure 2. Dorsum (A) and venter (B) of *Amblyseius rademacheri* (♀).

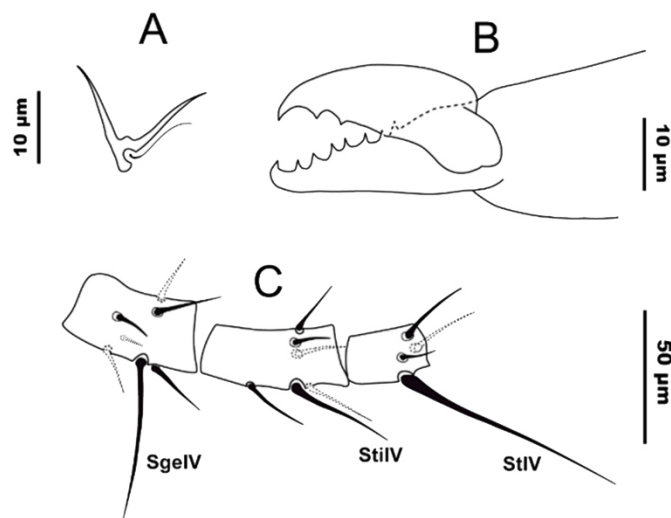


Figure 3. Spermatheca (A), chelicerae (B), and leg IV (C) of *Amblyseius rademacheri* (♀).

***Amblyseius swirskii* Athias-Henriot, 1962**

Material examined (open field): Çaybaşı, 10.10.2014, *P. vulgaris* (2♀♀), *C. sativus* (13♀♀), *S. melongena* (2♀♀, 1♂), *C. annuum* (2♀♀, 2♂♂); Fatsa, 28.08.2014, *C. annuum* (1♀); Gülyalı 17.09.2015, *C. sativus* (3♀♀), *S. melongena* (1♀); Altınordu, 21.07.2015, *P. vulgaris* (3♀♀), *C. sativus* (9♀♀); Perşembe, 27.09.2013, *C. annuum* (1dn), 09.07.2014, *C. annuum* (1♀); Ulubey, 06.09.2013, *P. vulgaris* (3♀♀), *Cucurbita* sp. (9♀♀, 2♂♂, 1dn), *C. sativus* (3♀♀), *C. annuum* (2♀♀, 2♂♂, 1dn), 11.09.2014, *Cucurbita* sp. (5♀♀, 1♂), *C. sativus* (1♀), *C. annuum* (2♀♀); Ünye, 07.08.2014, *Cucurbita* sp. (1♀).

Distribution: *A. swirskii* is an important biological control agent of mites and small insects (Demite et al., 2017). This predator was reported for the first time on *P. vulgaris*, *S. melongena* and *C. sativus* in Adana (Kibritçi et al., 2007). In present study, it was collected in association with colonies of *B. lewisi* on *C. annuum* and *Cucurbita* sp., *B. obovatus* and *T. palmarum* on *C. sativus* and with *T. urticae* on all examined vegetable species.

***Aristadromips masseei* (Nesbitt, 1951)**

Material examined (open field): Altınordu, 20.07.2013, *Cucurbita* sp. (5♀♀, 2♂♂), 21.07.2015, *C. sativus* (1♀); Gülyalı, 10.07.2013, *C. sativus* (1♀).

Material examined (greenhouse): Gürgentepe, 02.10.2014, *C. sativus* (2♀♀, 4♂♂).

Distribution: *A. masseei* was determined in northwestern countries of the Palearctic region (Demite et al., 2017). This predatory was found for the first time in Giresun Province, Turkey (Çobanoğlu, 1991-1992). In this study, it was collected together with *T. urticae* from *C. sativus* and *Cucurbita* sp. leaves.

***Euseius finlandicus* (Oudemans, 1915)**

Material examined (open field): Çaybaşı, 10.10.2014, *C. annuum* (2♀♀); Çatalpınar, 21.08.2014, *P. vulgaris* (1♀); Kabadüz, 26.09.2014, *C. annuum* (3♀♀); Perşembe, 27.09.2013, *C. sativus* (1♀).

Distribution: *E. finlandicus* is common around the world (Demite et al., 2017). In Turkey, this predatory mite was also determined by many researchers (Faraji et al., 2011). During this research, *E. finlandicus* was collected with *T. urticae* on *P. vulgaris* and *C. sativus*.

***Euseius gallicus* Kreiter and Tixier, 2010**

Material examined (open field): Gülyalı, 19.08.2015, *P. vulgaris* (7♀♀), *C. sativus* (10♀♀, 2♂♂), *C. annuum* (1♀).

Distribution: *E. gallicus* has been reported in Tunisia (Kreiter et al., 2010), Belgium, France, Germany, the Netherlands and Turkey (Tixier et al., 2009; Döker et al., 2014b). In this research, it was found together with *Xenotarsonemus* sp., *T. goetzi* and *B. mali* on *C. annuum*.

***Kampimodromus aberrans* (Oudemans, 1930)**

Material examined (open field): Kabadüz, 26.09.2014, *C. sativus* (1♀); Perşembe, 09.07.2014, *Cucurbita* sp. (1♂).

Distribution: Cosmopolitan *K. aberrans* has been recorded worldwide (Demite et al., 2017). It is one of the most common species in Turkey (Faraji et al., 2011). During this study, it was collected together with *T. goetzi* on *Cucurbita* sp. and *T. urticae* on *C. sativus*.

***Neoseiulus barkeri* Hughes, 1948**

Material examined (open field): Fatsa, 28.08.2014, *Cucurbita* sp. (2♀♀); Perşembe, 27.09.2013, *P. vulgaris* (1♀), *S. lycopersicum* (1♀), *S. melongena* (1♀); Ulubey, 11.09.2014, *S. melongena* (2♀♀).

Material examined (greenhouse): Perşembe, 23.07.2013, *C. sativus* (1♀).

Distribution: *N. barkeri* has been found in many countries around the world (Demite et al., 2017). In Turkey, it was determined on *S. melongena* in Antalya (Çobanoğlu, 1989a) and *A. cepa* in İzmir (Kılıç et al., 2012). It was found in association with *T. urticae*, *B. obovatus* on *S. melongena* and *T. urticae* on *Cucurbita* sp. in this study.

***Neoseiulus bicaudus* (Wainstein, 1962)**

Material examined (open field): Ünye, 07.08.2014, *A. cepa* (1♀).

Distribution: *N. bicaudus* has been reported in Palearctic region (Asali Fayaz & Khanjani, 2012). In Turkey, it was found on *C. sativus* (İnal, 2005) and *S. melongena*, *Cucurbita* sp. (Can & Çobanoğlu, 2010) with *T. cinnabarinus*. In this study, *N. bicaudus* was collected together with population of *T. urticae* on *A. cepa*.

***Neoseiulus californicus* (McGregor, 1954)**

Material examined (open field): Fatsa, 13.09.2013, *S. melongena* (1♀); Perşembe, 09.07.2014, *Z. mays* (1♀).

Material examined (greenhouse): Perşembe, 23.07.2013, *C. annuum* (1♀); Ünye, 07.08.2014, *C. sativus* (13♀♀, 1♂).

Distribution: *N. californicus* is widely used as an effective biological control agent around the world. It has been found in many countries of the world (Demite et al., 2017). In Turkey, it was reported on *C. annuum* and *P. vulgaris* in association with *T. urticae* in Aydın (Çakmak & Çobanoğlu, 2006). Çobanoğlu & Kumral (2014) found *N. californicus* in association with populations of tetranychids in tomato fields in Ankara and Bursa. Döker et al. (2016) also determined this predatory mite with *T. urticae* on *S. melongena*.

***Phytoseiulus finitimus* Ribaga, 1904**

Material examined (open field): Çatalpınar, 21.08.2014, *S. melongena* (1♀); Gülyalı, 19.08.2015, *P. vulgaris* (1♀), *S. lycopersicum* (2♀♀); Kabadüz, 26.09.2014, *P. vulgaris* (2♀♀); Altınordu, 23.09.2013, *P. vulgaris* (3♀♀, 1♂), 20.07.2014, *Cucurbita* sp. (1♂), *S. lycopersicum* (1♂), *C. sativus* (2♀♀), *S. melongena* (3♀♀); Perşembe, 23.07.2013, *P. vulgaris* (1♀), 09.07.2014, *P. vulgaris* (1♀, 1♂), *Cucurbita* sp. (1pn), *C. sativus* (1♀); Ulubey, 06.09.2013, *P. vulgaris* (1♀), *Cucurbita* sp. (1♀), 11.09.2014, *C. annuum* (1♀); Ünye, 26.07.2013, *C. sativus* (1♀), 07.08.2014, *C. annuum* (1♀).

Material examined (greenhouse): Fatsa, 28.08.2014, *C. sativus* (1♀); Ünye, 26.07.2013, *C. sativus* (1♂).

Distribution: *P. finitimus* is a common predatory mite species (Demite et al., 2017). It has been collected together with several mite species in many provinces of Turkey by many researchers (Faraji et al., 2011). In the current study, it was collected with *T. urticae*, *A. pulvinum*, *P. latus*, *T. goetzi*, *T. putrescentiae*, *B. obovatus*, *T. immanis* and *H. staerki* on *C. annuum*, *P. vulgaris*, *S. melongena*, *S. lycopersicum* and *C. sativus*.

***Phytoseiulus persimilis* Athias-Henriot, 1957**

Material examined (open field): Çaybaşı, 10.10.2014, *P. vulgaris* (5♀♀, 1pn), *C. sativus* (1♀); Çatalpınar, 21.08.2014, *P. vulgaris* (10♀♀, 1♂), *S. melongena* (1♀); Fatsa, 13.09.2013, *S. lycopersicum* (1♂), 28.08.2014, *P. vulgaris* (1♀, 4♂♂, 1pn); Gülyalı, 19.08.2015, *P. vulgaris* (1♀), 17.09.2015, *P. vulgaris* (7♀♀, 1♂); Altınordu, 21.07.2015, *C. sativus* (1♀); Perşembe, 29.07.2014, *Cucurbita* sp. (2♀♀); Ünye, 07.08.2014, *P. vulgaris* (1♀, 2pn, 4tn), *C. lanatus* (1♀).

Material examined (greenhouse): Ünye, 26.07.2013, *C. sativus* (15♀♀, 1♂), *C. annuum* (1♀).

Distribution: *P. persimilis* is a common predatory species around the world (Demite et al., 2017) and has been successfully used for years for the biological control of *T. urticae* in many countries. Natural populations of *P. persimilis* have been recorded in Turkey (Şekeroğlu & Kazak 1993; İnal, 2005; Akyazı & Ecevit, 2008; Kasap et al., 2013; Çobanoğlu & Kumral, 2014).

***Proprioseiopsis okanagensis* (Chant, 1957)**

Material examined (open field): Kabadüz, 26.09.2014, *Cucurbita* sp. (1♀).

Distribution: *P. okanagensis* was reported in Europe, North America (Demite et al., 2017) and Turkey (Çobanoğlu, 1989c; Çobanoğlu & Bayram, 1999).

***Transeius wainsteini* (Gomelauri, 1968)**

Material examined (open field): Çaybaşı, 10.10.2014, *C. annuum* (1♀); Gürgentepe, 02.10.2014, *Cucurbita* sp. (1♀); Perşembe, 23.07.2013, *C. sativus* (1♀), 27.09.2013, *C. annuum* (1♀); Ünye, 07.08.2014, *Cucurbita* sp. (1♀).

Distribution: Demite et al. (2017) listed *T. wainsteini* in Armenia, Azerbaijan, Denmark, Georgia, Germany, Russia, Iran and Poland and Turkey. In this study, it was collected together with *B. lewisi*, *H. staerki* and *T. urticae* on *C. annuum*, *Cucurbita* sp. and *C. sativus*.

***Typhlodromus athiasae* Porath and Swirski, 1965**

Material examined (greenhouse): Ünye, 26.07.2013, *C. sativus* (28♀♀, 7♂♂), *C. annuum* (2♀♀, 1♂).

Distribution: *T. athiasae* is widespread around the world (Azerbaijan, Cyprus, Egypt, France, Greece, Iran, Israel, Jordan and Syria) (Demite et al., 2017). In Turkey, this predatory mite has been found by many researchers (Faraji et al., 2011).

Conclusion

A total of 43 mite species were identified during this study with 27% these found in both open fields and greenhouses. The others were found only in the open fields. Our results showed that the vegetables growing areas of Ordu Province, especially in open field conditions, are extremely rich with regard to beneficial mite fauna. This may be due to the limited usage of pesticides in the area. Therefore, the results obtained from the study may help to evaluate potential of the predators for biological control of phytophagous mites, including *T. urticae* and *P. latus* in Ordu. *Amblyseius rademacheri*, a promising predator was also found for the first time in Turkey. Therefore, in further studies it should be determined if *A. rademacheri* can be used in biological control programs in Turkey.

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