

Mite fauna (Acari: Prostigmata, Mesostigmata, Astigmata) of coniferous plants in Turkey*

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Summary

Pest and predatory mite species were surveyed on coniferous plants in Turkey between 1999 and 2003. Forty seven plant samples were collected from different localities in Turkey. Twenty three mite species belonging 7 families were identified. They are: **Blattisocius tarsalis** (Berlese) (Ascidae); **Acaropsis sollers** Rohdendorf, **Cheletogenes ornatus** (Canestrini & Fanzago) (Cheyletidae); **Amblyseius andersoni** (Chant), **Amblyseius armeniacus** Arutunjan & Ohandjanian, **Amblyseius kadzhajai** Gomelauri, **Anthoseius recki** (Wainstein), **Anthoseius involutus** Livshits & Kuznetzov, **Anthoseius tranquillus** (Livshits & Kuznetzov), **Anthoseius bagdasarjani** Wainstein & Arutunjan, **Typhlodromus cotoneastri** Wainstein, **Typhlodromus andrei** Karg (Phytoseiidae); **Oligonychus coniferarum** (McGregor), **Oligonychus milleri** (McGregor), **Bryobia drummondi** (Ewing) Pritchard & Baker, **Bryobia praetiosa** Koch (Tetranychidae); **Cenopalpus lineola** (Canestrini & Fanzago), **Cenopalpus sipinosus** (Donnadieu), **Pentamerismus oregonensis** McGregor, **Pentamerismus taxi** (Hailer), **Aegyptobia tragardhi** Sayed (Tenuipalpidae); **Tyrophagus perniciosus** Zachvatkin (Acaridae) and **Glycyphagus ornatus** Kramer (Glycyphagidae). **T. andrei**, **O. milleri** and **P. oregonensis** are new records for Turkish acarofauna.

Pinus nigra Arnold was the most preferred and populated coniferous host plant (76.16 %) while **Picea pungens** Engelm was rarely populated by mites (0.39 %). **O. coniferarum** (17.32 %), **C. lineola** (12.20 %) and **O. milleri** (11.81%) were the most frequent pest mite species, while **A. bagdasarjani**, **A. tranquillus** (5.11%) and **A. involutus** (3.54 %) were the most common predatory species.

Key words: Prostigmata, Mesostigmata, Astigmata, Coniferous plants, Turkey

Anahtar sözcükler: Prostigmata, Mesostigmata, Astigmata, Konifer, Türkiye

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Introduction

Coniferous or pine trees of the genus *Pinus* are distinguished from all other trees by having uncovered seeds borne in pairs on the bracts of female cones (as do other genera of the Pinaceae family), and narrow leaves (needles) arranged in bundles of 2 to 5 with permanent or deciduous sheaths at their bases. They are generally long-lived, usually over 100 years in suitable environments (Arslan & Çelem, 2002).

Fauna on the coniferous plants include many groups of harmful and beneficial organisms. Although there have been many reports on coniferous insects and mites throughout the world (Kropczynska et al., 1985), very little is known about coniferous mites in Turkey (Uysal et al., 2001; Çobanoğlu et al., 2003). The aim of this study was to identify mites of coniferous plants in Turkey.

Material and Methods

Pest and predatory mite species were surveyed on coniferous plants in Turkey between 1999 and 2003. All the mite samples were used for different habitats and hosts. Samplings were done from 7 different coniferous species (*Abies cephalonica* Link, *Pinus nigra* Arnold, *Pinus sylvestris* L., *Pinus brutia* Ten, *Picea orientalis* (L.) Link, *Picea pungens* Engelm., *Thuja orientalis* L.) from different localities in Turkey. In total; 47 samples were taken from the bark of trees and needles. Mites were extracted by using Berlese funnels and preserved in 70 % alcohol. They were cleared in lactophenol solution and mounted in Hoyer's fluid for identification. The slides were kept for 2-4 weeks at 35°C. The results of these surveys are based mainly on prostigmatid, mesostigmatid and astigmatid mites.

All samples were collected by the junior author. Samples of all mites were deposited in the senior author's collection at the University of Ankara, Agricultural Faculty, Plant Protection Department, Ankara, Turkey.

For identification purposes original descriptions and the following keys were used: Baker (1949), Pritchard & Baker (1955), Summers & Price (1970), Jeppson et al. (1975), Hughes (1976), Arutunjan (1977), Begljarov (1981), Chant and Yoshida-Shaul (1987). The identification of the plants was done by Dr. Solmaz Sözeri (Ankara University, Agriculture Faculty, Department of Plant Protection, 06110 Ankara, Turkey).

Results and Discussion

Twenty three mite species belonging to 7 families were identified. Of these, 11 species are considered phytophagous species, while twelve of them are beneficial species. The rest of them are fungivorous or storage mite species. Three species are new records for Turkey, and they are *Typhlodromus andrei* Karg (Phytoseiidae), *Oligonychus milleri* (McGregor) (Tetranychidae) and *Pentamerismus oregonensis* McGregor (Tenuipalpidae) (Table 1).

Table 1. Mite species, host plants and their occurrence on coniferous plants in Turkey between 1999-2003

Mite species	Host plants and their occurrence							Total
	<i>A. cephalonica</i>	<i>P. nigra</i>	<i>P. sylvestris</i>	<i>P. brutia</i>	<i>P. orientalis</i>	<i>P. pungens</i>	<i>T. orientalis</i>	
Mesostigmata								
Ascidae								
<i>Blattisocius tarsalis</i> •		2♀♀						2
Phytoseiidae								
<i>Amblyseius armeniacus</i> •		2♀♀						2
<i>Amblyseius andersoni</i> •		4♀♀						4
<i>Amblyseius kadzhajai</i> •		2♀♀ (litter)						2
<i>Anthoseius bagdasarjani</i> •		6♀♀, 2♂♂		4♀♀, 2♂♂				14
<i>Anthoseius involutus</i> •				7♀♀, 2♂♂				9
<i>Anthoseius recki</i> •		1♀						1
<i>Anthoseius tranquillus</i> •		9♀♀, 3♂♂						12
<i>Typhlodromus cotoneastiri</i> •		1♀		5♀♀				6
<i>Typhlodromus andrei</i> ••		6♀♀						6
Prostigmata								
Cheyletidae								
<i>Acaropsis sollers</i> •		1♀						1
<i>Cheletogenes ornatus</i> •				3♀♀				3
Tetranychidae								
<i>Bryobia drummondii</i> †		16♀♀						16
<i>Bryobia praetiosa</i> †		3♀♀						3
<i>Oligonychus coniferarum</i> †		27♀♀, 1♂	15♀♀			2♀♀		45
<i>Oligonychus milleri</i> *†		29♀♀, 1♂						30
Tenuipalpidae								
<i>Aegyptobia tragardhi</i> †		14♀♀	2♀♀	1♀				17
<i>Cenopalpus lineola</i> †		31♀♀						31
<i>Cenopalpus sipinosus</i> †		18♀♀		1♀				19
<i>Pentamerismus oregonensis</i> *†		13♀♀	3♀♀				10♀♀	26
<i>Pentamerismus taxi</i> †							1♀	1
Astigmata								
Acaridae								
<i>Tyrophagus perniciosus</i> ♦				1♀				1
Glycyphagidae								
<i>Glycyphagus ornatus</i> ♦		3♀♀						3
Total	No mites	195	20	26	No mites	2	11	254

* First report of this species on coniferous plants in Turkey, • Predatory species, † pest species, ♦ fungivorous or storage mite species.

Pinus nigra was the most preferred and populated coniferous host plant (76.16 %) while ***Picea pungens*** was rarely populated by mites (0.39 %) (Figure 1). ***Oligonychus coniferarum*** (17.32 %), ***C. lineola*** (12.20 %) and ***O. milleri*** (11.81 %) were the most common harmful mite species while ***A. bagdasarjani***, ***A. tranquillus*** (5.11 %) and ***A. involutus*** (3.54 %) were the most common predatory species (Figure 2).

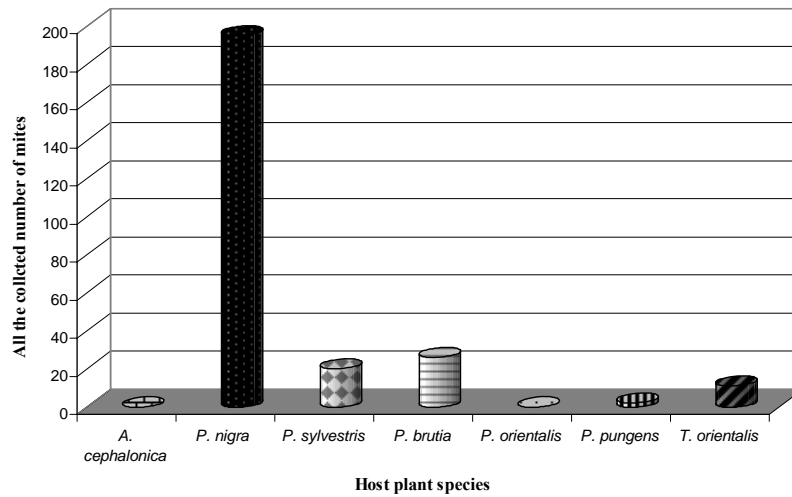


Figure 1. Host range of identified mite specimen that has been found on each coniferous host plants in Turkey between 1999-2003.

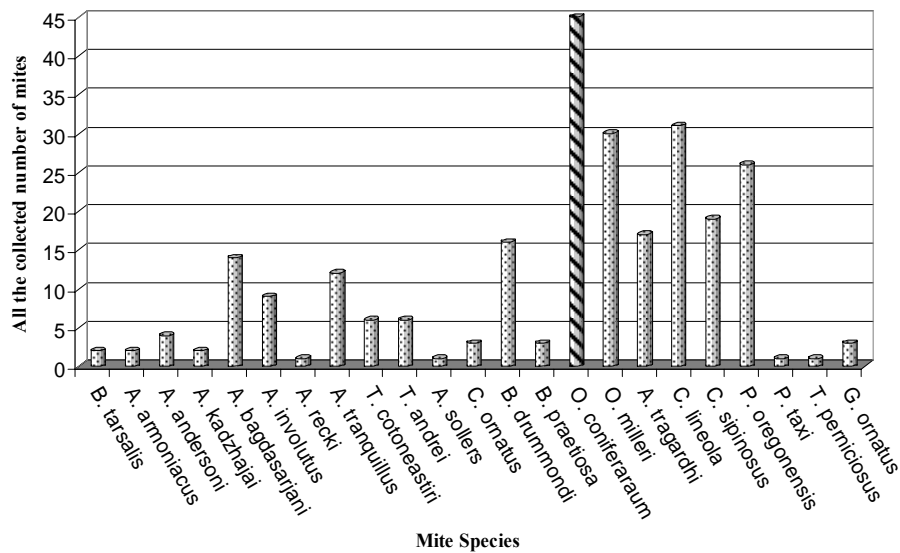


Figure 2. Occurrence of each mite species that has been found on coniferous host plants in Turkey between 1999-2003.

Ascidae

Blattisocius tarsalis (Berlese, 1918)

Material examined: İstanbul (Büyükdada), 30.07.2000, (2♀♀), ***P. nigra*** (needle).

Comments: ***B. tarsalis*** is a very common predatory mite species on small insects and their eggs in storage (Ozer et al., 1989; Çobanoğlu, 1996). This species was reported on stored rice, stored hazelnut, ***Corylus avellanae*** L. and ***Hyacinthus orientalis*** L. (Liliaceae) previously (Öksüz & Özman, 1999; Özman & Zdarkova, 2000; Özman & Çobanoğlu, 2001; Çobanoğlu & Özman, 2002; Bayram & Çobanoğlu, 2005).

Cheyletidae

Acaropsis sollers Rohdendorf, 1946

Material examined: Aydın (Çine), 21.05.1999, (1♀), ***P. nigra***.

Comments: This species was previously reported from stored products in İzmir (Özer et al., 1989).

Cheletogenes ornatus (Canestrini & Fanzago, 1876)

Material examined: Ankara (Çamlıdere), 30.04.2000, (2♀♀), ***P. nigra*** (needle); Bartın (Amasra), 10.05.2003, (1♀), ***P. nigra*** (bark).

Comments: This species was previously reported from citrus and pome fruit trees (***Malus communis*** L. and ***Cydonia vulgaris*** Pers.) in İzmir and Bursa (Madanlar, 1991; Kumral, 2005). ***Cheletogenes ornatus*** was also reported from dried apricot storages in İzmir (Çobanoğlu, 2004b).

Phytoseiidae

Amblyseius andersoni (Chant, 1957)

Material examined: Bartın (Amasra), 10.05.2003, (4♀♀), ***P. nigra*** (bark).

Comments: This species was previously recorded from the Black Sea, the Marmara and Mediterranean regions of Turkey (Şekeroğlu, 1984; Çobanoğlu, 1989, 1991, 2004a).

Amblyseius armeniacus Arutunjan & Ohandjanian, 1972

Material examined: Çankırı (İlgaz), 13.05.1999, (2♀♀), ***P. nigra***, (needle and bark).

Comments: ***A. armeniacus*** was reported from ***Rosa damascena*** (Mill.) and ***Rosa canina*** L. (Rosaceae) in Ankara (Çobanoğlu & Bayram, 1999).

Amblyseius kadzhajai Gomelauri, 1968

Material examined: Karabük (Safranbolu), 10.05.2003, (2♀♀), ***P. nigra*** (litter from beneath plants).

Comments: This is a very rare species and was previously reported from *Malus communis* L. in Niğde (Çobanoğlu, 1997).

Anthoseius bagdasarjani Wainstein & Arutunjan, 1967

Material examined: Muğla (Bodrum), 23.05.1999, (4♀♀, 2♂♂), *P. brutia* (needle); Van, 27.06.2003, (6♀♀, 2♂♂), *P. nigra* (needle).

Comments: *A. bagdasarjani* was reported from woody ornamental plants in Ankara (Çobanoğlu et al., 2003).

Anthoseius involutus Livshits & Kuznetzov, 1972

Material examined: Muğla (Bodrum), 21.05.1999, (7♀♀, 2♂♂), *P. brutia* (needle).

Comments: *A. involutus* was reported from apple in Ankara (Çobanoğlu, 1997).

Anthoseius recki (Wainstein, 1958)

Material examined: Zonguldak (Devrek), 10.5.2003, (1♀), *P. nigra* (bark).

Comments: This species is found all over Turkey (Swirski & Amitai, 1982; Şekeroğlu, 1984; Çobanoğlu, 1989, 1991, 2004a; Madanlar, 1992; Kumral, 2005).

Anthoseius tranquillus (Livshits & Kuznetzov, 1972)

Material examined: Antalya, 18.04.1999, (1♀), *P. nigra* (needle); İstanbul (Büyükkada), 30.07.2000, (1♀, 3♂♂), *P. nigra* (needle); Mersin, 04.09.2000, (7♀♀), *P. nigra* (needle).

Comments: This predatory mite species is common on fruit trees and in vineyards and distributed all over the country (Çobanoğlu, 1997; Göven et al., 2002).

Typhlodromus andrei Karg, 1982

Material examined: Çankırı (Ilgaz), 13.05.1999, (1♀), *P. nigra* (needle and bark); Ankara (Çamlıdere), 30.04.2000, (4♀♀), *P. nigra* (bark); Ankara (Çamlıdere), 28.03.2003, (1♀), *P. nigra* (bark).

Comments: This is a new record for Turkey. This species was reported from the bark of trees in Belgium (Chant & Yoshida-Shaul, 1987).

Typhlodromus cotoneastri Wainstein, 1961

Material examined: Antalya (Alanya-Avsallar), 02.09.1999, (1♀), *P. brutia* (needle); Karabük (Safranbolu), 10.05.2003, (5♀♀), *P. nigra* (needle).

Comments: This species was obtained from central Anatolia (Swirski & Amitai, 1982; Şekeroğlu, 1984; Çobanoğlu, 1991) and the Marmara region of Turkey (Çobanoğlu, 2004a).

Tetranychidae

Bryobia drummondi (Ewing) Pritchard & Baker, 1955

Material examined: Mersin (Gülner), 04.09.2000, (1♀), ***P. nigra*** (needle); Ankara (Kızılcahamam), 23.03.2003, (5♀♀), ***P. nigra*** (bark); Ankara (Çamlıdere), 28.03.2003, (9♀♀), ***P. nigra*** (bark); Karabük (Safranbolu), 10.05.2003, (1♀), ***P. nigra*** (needle).

Comments: ***B. drummondi*** is not known very well in Turkey.

Bryobia praetiosa Koch, 1835

Material examined: Ankara (Kızılcahamam), 23.03.2003, (3♀♀), ***P. nigra*** (bark).

Comments: This is a very common species occurring in orchards and uncultivated areas in Turkey. Reported from Ankara on ***Muscari longipes*** Boiss (Liliaceae) (Bayram & Çobanoğlu, 2006).

Oligonychus coniferarum (McGregor, 1950)

Material examined: Çankırı (Ilgaz), 13.05.1999, (1♀), ***P. nigra*** (needle and bark); Denizli (Pamukkale), 21.05.1999, (1♀), ***P. nigra*** (needle); Ankara 02.06.1999 (7♀♀) ***P. nigra*** (needle); Ankara (Çamlıdere) 20.06.1999 (8♀♀) ***P. nigra*** (needle); Ankara, 23.11.1999, (9♀♀, 1♂), ***P. nigra*** (needle); İstanbul (Büyükdada), 30.07.2000, (1♀), ***P. nigra*** (needle); Van (Edremit), (3♀♀), Van (Çakırbey), 25.06.2003, (12♀♀), ***P. sylvestris*** (needle); Ankara, 22.11.1999, (2♀♀), ***P. pungens*** (needle).

Comments: This species was reported from ***P. sylvestris*** in Erzurum (Ecevit, 1977) and from ***Cornus alba*** 'Sibirica', ***Juniperus horizontalis*** Moench, ***Juniperus sabina*** L. in Ankara (Uysal et al., 2001).

Oligonychus milleri (McGregor, 1950)

Material examined: İstanbul (Büyükdada), 30.07.2000, (14♀♀, 1♂), ***P. nigra*** (needle); Karaman 04.09.2001 (15♀♀) ***P. nigra*** (needle).

Comments: This is a new record for Turkey. It occurs on several conifers all over the world (Pritchard & Baker, 1955; Jeppson et al., 1975).

Tenuipalpidae

Aegyptobia tragardhi Sayed, 1950

Material examined: Muğla (Bodrum), 21.05.1999, (1♀), ***P. brutia*** (needle); Antalya (Güçlü köy), 17.03.2000, (13♀♀), ***P. nigra*** (needle); Ankara (Çamlıdere), 30.04.2000, (1♀), ***P. nigra*** (needle); Van (Çakırbey), 25.06.2003, (2♀♀), ***P. sylvestris*** (needle).

Comments: Reported from Ankara on *Juniperus oxycedrus* L., *J. horizontalis* and other coniferous plants (Uysal et al., 2001).

Cenopalpus lineola (Canestrini & Fanzago, 1878)

Material examined: Mersin (Gülнар), 04.09.2000, (1♀), *P. nigra* (needle); Uşak, 15.09.2000, (28♀♀), *P. nigra* (needle); Karaman, 04.09.2001, (1♀), *P. nigra* (needle); Zonguldak (Devrek), 10.05.2003, (1♀), *P. nigra* (needle).

Comments: This species was previously collected on coniferous plants from Bursa and İzmir, 05.01.1961 and 19.03.1969 (from collection of Prof. Dr. Zeliha Düzgüneş, Ankara University, Agriculture Faculty, Plant Protection Department, 06110 Ankara, Turkey). This is a pest of pine trees, distributed in Europa and Near East countries (Jeppson et al., 1975).

Cenopalpus spinosus (Donnadieu, 1875)

Material examined: Antalya (Alanya-Avsallar), 02.09.1999, (1♀), *P. brutia* (needle); Aydın (Kuşadası), 15.09.2000, (18♀♀), *P. nigra* (needle).

Comments: This species was collected previously on *Crataegus* sp. 17.09.1963 from Ankara (from collection of Prof. Dr. Zeliha Düzgüneş, Ankara University, Agriculture Faculty, Plant Protection Department, 06110 Ankara, Turkey). This is a pest of Rosaceous plants and distributed in Near East countries and Turkey (Jeppson et al., 1975).

Pentamerismus oregonensis McGregor, 1949

Material examined: Ankara (Haymana), 17.11.1999, (13♀♀), *P. nigra* (needle); Van (Çakırbey), 25.06.2003, (3♀♀), *P. sylvestris* (needle); Ankara (Haymana), 17.11.1999, (7♀♀), *T. orientalis* (needle); Ankara, 23.11.1999, (3♀♀), *T. orientalis* (needle).

Comments: This is a new record for Turkey. *P. oregonensis* was found on *Cupressus* spp. and *Juniperus* spp.; and distributed U.S.A and Japan (Pritchard & Baker, 1958).

Pentamerismus taxi (Hailer, 1877)

Material examined: Ankara, 23.11.1999, (1♀), *T. orientalis* (needle).

Comments: False spider mites are very common on orchard plants and ornamental trees in Turkey. *P. taxi* was previously reported from Ankara on *Juniperus arizonica*, *J. hibernica*, *J. sabina* L. (Cupressaceae), *Taxus baccata* L. (Taxaceae) (Uysal et al., 2001) and on *Anemone coronaria* L. (Ranunculaceae) (Bayram & Çobanoğlu, 2006).

Acaridae

Tyrophagus perniciosus Zachvatkin, 1941

Material examined: Antalya, (Alanya-Avsallar), 02.09.1999, (1♀), **P. brutia** (needle).

Comments: This species was reported previously from Ankara on **Morchella** spp. (Ascomycetes), wild and cultivated roses (Çobanoğlu & Bayram, 1998, 1999) and on tulip bulbs in Ankara, Turkey (Bayram & Çobanoğlu, 2006).

Glycyphagidae

Glycyphagus ornatus Kramer, 1881

Material examined: Ankara (Çamlidere), 18.04.1999, (3♀♀), **P. nigra** (bark).

Comments: This is a pest of storages and it can occur in animal feed stuffs and nests (Hughes, 1976). **G. ornatus** is not well known species in Turkey. It was found on stored hazelnut in the Black Sea region (Özman & Zdarkova, 2000).

A total of 7 different coniferous plant species were examined from recreation and forest areas in Turkey. In total, 254 mite specimens were collected and 23 species were identified. Three species are newly added to the Turkish acarofauna, **T. andrei**, **O. milleri** and **P. oregonensis**, **O. coniferarum** (17.32 %), **C. lineola** (12.20 %) and **O. milleri** (11.81 %) were the most frequent harmful species while **A. bagdasarjani**, **A. tranquillus** (5.11 %) and **A. involutus** (3.54 %) were the most common predatory species. Some species occurred at very low frequencies. **A. sollers**, **A. recki**, **P. taxi** and **T. perniciosus** were represented by a single specimen each, while **B. tarsalis**, **A. armeniacus** and **A. kadzhajai** were presented by two specimens each. **P. nigra** was the most preferred host plant with 195 specimens, while **P. brutia** was second with 26 specimens. Only two **O. coniferarum** specimens were found on **P. pungens** and no mites were found on **A. cephalonica** and **P. orientalis** (Table 1).

Conclusions: 1- Coniferous mite fauna, and especially beneficial mite fauna, are very rich in Turkey. Effectiveness of these species for the control of the pest species should be a further step of these studies. 2- Biodiversity studies must be sustainable. 3- Controlling of the pest species in the sense of ecological balance of protected areas is very important for the coniferous forest ecosystems in Turkey.

Özet

Türkiye'nin konifer akar (Acari: Prostigmata, Mesostigmata, Astigmata) faunası

1999-2003 yılları arasında yapılan sürveylerde Türkiye'nin farklı bölgelerinden toplanan koniferlerden 47 örnek alınmış bu örnekler sonucunda 7 familyaya ait 23 tür tespit edilmiştir. Bunlar; **Blattisocius tarsalis** (Berlese) (Ascidae); **Acaropsis sollers**

Rohdendorf, **Cheletogenes ornatus** (Canestrini & Fanzago) (Cheyletidae); **Amblyseius andersoni** (Chant), **Amblyseius armeniacus** Arutunjan & Ohandjanian, **Amblyseius kadhajai** Gomelauri, **Anthoseius recki** (Wainstein), **Anthoseius involutus** Livshits & Kuznetzov, **Anthoseius tranquillus** (Livshits & Kuznetzov), **Anthoseius bagdasarjani** Wainstein & Arutunjan, **Typhlodromus cotoneastri** Wainstein, **Typhlodromus andrei** Karg (Phytoseiidae); **Oligonychus coniferarum** (McGregor), **Oligonychus milleri** (McGregor), **Bryobia drummondi** (Ewing) Pritchard & Baker, **Bryobia praetiosa** Koch (Tetranychidae); **Cenopalpus lineola** (Canestrini & Fanzago), **Cenopalpus sipinosus** (Donnadieu), **Pentamerismus oregonensis** McGregor, **Pentamerismus taxi** (Hailer), **Aegyptobia tragardhi** Sayed (Tenuipalpidae); **Tyrophagus perniciosus** Zachvatkin (Acaridae) ve **Glycyphagus ornatus** Kramer (Glycyphagidae)'dir. **T. andrei**, **O. milleri** ve **P. oregonensis** türleri ülkemiz akar faunası için yeni kayıttır.

Koniferler içinde **Pinus nigra** Arnold üzerinde (% 76,16) en yoğun akar bulunmasına rağmen en az **Picea pungens** Engelm (% 0,39) üzerinde akara rastlanmıştır. **O. coniferarum** (% 17,32), **C. lineola** (% 12,20) ve **O. milleri** (% 11,81) türleri en sık rastlanılan zararlı türlerden, **A. bagdasarjani**, **A. tranquillus** (% 5,11) ve **A. involutus** (% 3,54) ise en sık rastlanan faydalı akarlardır.

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