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Mite (Acari) fauna in apple orchards of around the Lake Van basin of Turkey

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Summary

Phytophagous and predatory mite species were determined in apple orchards in Van Lake basin (Turkey) during 2002-2004. Totally, eighteen mite species belonging to six families, Tetranychidae, Eriophyidae, Tenuipalpidae, Phytoseiidae, Stigmaeidae and Tydeidae, were identified on the apple orchards. It was found that ***Amphitetranychus viennensis*** (Zacher) (Acari: Tetranychidae) is the most common and important pest species while ***Kampimodromus aberrans*** (Oudemans) (Acari: Phytoseiidae), ***Euseius finlandicus*** (Oudemans) (Acari: Phytoseiidae) and ***Zetzellia mali*** (Ewing) (Acari: Stigmaeidae) are the most common predatory mite species in the apple orchards of the region.

Key words: Acari, predaceous mites, pest mites, apple, Van Lake Basin.
Anahtar sözcükler: Acari, avcı akarlar, zararlı akarlar, elma, Van Gölü Havzası.

Introduction

Apple is one of the most common crops in the World with 58 billion tons production (Gül & Erkan, 2001) and has very important role in human nutrition. Turkey has 2.410 thousand tons apple production in a year which is 4.2 % of the world production. Apple growing areas are mainly concentrated in the regions of Bursa-Yalova-Çanakkale, Amasya-Tokat, Isparta–Burdur, Niğde-Nevşehir-Kayseri and Antalya in Turkey (Gül & Erkan, 2001). In the province of Van, approximately 4568 tons of apple are produced 1596 ha in each year, accounting for 0.2 % of Turkey's total apple production (Anonymous, 2006).

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Insect and mite pests are one of the major constraints to expansion of apple production in Turkey (Yiğit & Uygun, 1981; İncekulak & Ecevit, 2002; Yanar & Ecevit, 2005). Spider mites especially tetranychid mites within these pests cause important yield loses in apple (Jeppson et al., 1975; Düzgüneş, 1977; Düzgüneş & Kılıç, 1983). The mite fauna of apple orchards was mainly investigated in Central, Mediterranean, Black Sea and the Marmara Region of Turkey (Yiğit & Uygun, 1981; Düzgüneş & Kılıç, 1983; Yıldız, 1998; İncekulak & Ecevit, 2002; Yanar & Ecevit, 2005). Mite species on apple trees have not been studied in Van province and information about them is not available in the literature. The aim of this study was to determine mite species on apple trees in Van Lake Basin of Turkey.

Material and Methods

The mite samples were collected from Van and Bitlis provinces of Eastern part of Turkey between May and September during 2002 and 2004. In total, 112 plant samples were collected from two different regions of Van Lake which are 60 samples from Van (Gevaş, Edremit, Erciş, Van) and 52 samples from Bitlis (Ahlat, Adilcevaz, Tatvan). Plant leaves from each sampling places in both unsprayed and sprayed apple orchards were collected weekly and placed in plastic bags. Samples were taken to the laboratory in an ice chest and examined under stereomicroscope. After clearing the mite samples in lactophenol solutions, they were mounted in Hoyer's medium. Identification was based on Pritchard & Baker (1955), Baker (1965), Jeppson et al. (1975), Arutunjan (1977), Chant & Yoshida-Shaul (1987). The samples have been deposited in the collection of Dr. İsmail KASAP at the Plant Protection Department, Agriculture Faculty, Onsekiz Mart University, Çanakkale, Turkey.

Results

The eighteen mite species belonging to six families were identified. The nine species are considered as predatory mite while eight species are phytophagous mite. One species is pollenophagous or neutral (1 Tydeidae) species.

Phytophagous species

Tetranychidae

Amphitetranychus viennensis (Zacher, 1920)

Material examined: **Van** (Central Province), 30.V.2002 (25 ♀♀, 9 ♂♂), 05.VII.2002 (12 ♀♀, 5 ♂♂), 15.VIII.2002 (15 ♀♀, 5 ♂♂), 20.VIII.2002(12 ♀♀, 10 ♂♂); (Edremit), 17.V.2002 (19 ♀♀, 11 ♂♂), 30.V.2002 (8 ♀♀, 5 ♂♂), 20.VII.2002 (7 ♀♀, 5 ♂♂), 13.IX.2002 (25 ♀♀, 12 ♂♂), 22.IX.2002 (20 ♀♀, 11 ♂♂), 25.V.2003 (21 ♀♀, 13 ♂♂); (Gevaş), 25.VI.2002 (25 ♀♀, 14 ♂♂), 17.VII.2002 (25 ♀♀, 15 ♂♂),

25.VII.2002 (20 ♀♀, 10 ♂♂), 22.IX.2002 (5 ♀♀); (Erciş), 27.VI.2002 (25 ♀♀, 10 ♂♂), 01.VIII.2002 (25 ♀♀, 11 ♂♂), 27.VIII.2002 (25 ♀♀, 8 ♂♂), 22.IX.2002 (7 ♀♀), 25.VI.2003 (15 ♀♀, 8 ♂♂), 26.VIII.2004 (12 ♀♀, 6 ♂♂). **Bitlis** (Ahlat), 27.VI.2002 (13 ♀♀, 5 ♂♂), 27.VIII.2002 (12 ♀♀), 22.IX.2002 (8 ♀♀, 4 ♂♂), 25.VI.2003; (Adilcevaz), 27.VI.2002 (8 ♀♀, 5 ♂♂), 01.VIII.2002 (8 ♀♀, 4 ♂♂), 22.IX.2002 (6 ♀♀, 4 ♂♂), 26.VIII.2004 (5 ♀♀, 3 ♂♂); (Tatvan), 07.VIII.2003 (5 ♀♀), 10.VIII.2003 (11 ♀♀, 6 ♂♂), 15.VIII.2003 (13 ♀♀, 4 ♂♂), 16.VIII.2003 (7 ♀♀), 13.VIII.2004 (12 ♀♀), 26.VIII.2004 (10 ♀♀, 5 ♂♂).

Comments: ***A. viennensis*** (Howthorn spider mite) is well known pest species in Turkey. It was recorded first time in Ankara on fruit trees (Düzgüneş, 1961). This mite is one of the most important pests in apple orchards and widely distributed in all growing areas of Turkey (Göksu, 1968; Düzgüneş, 1977; Yiğit & Uygun, 1981; Düzgüneş & Kılıç, 1983; Yanar & Ecevit, 2005). During these surveys, ***A. viennensis*** was determined in all the apple orchards and one of the major pests in Van Lake Basin (Table 1).

Tetranychus urticae Koch, 1836

Material examined: **Van** (Central Province), 30.V.2002 (5 ♀♀, 3 ♂♂), 05.VII.2002 (10 ♀♀, 6 ♂♂), 15.VIII.2002 (10 ♀♀, 4 ♂♂), 20.VIII.2002(12 ♀♀); (Edremit), 30.V.2002 (8 ♀♀), 20.VII.2002 (7 ♀♀, 4 ♂♂), 13.IX.2002 (15 ♀♀, 9 ♂♂), 22.IX.2002 (10 ♀♀, 7 ♂♂), 25.V.2003 (11 ♀♀, 3 ♂♂); (Gevaş), 25.VI.2002 (5 ♀♀, 5 ♂♂), 17.VII.2002 (5 ♀♀), 25.VII.2002 (10 ♀♀, 4 ♂♂), 22.IX.2002 (5 ♀♀, 2 ♂♂); (Erciş), 27.VI.2002 (7 ♀♀, 5 ♂♂), 01.VIII.2002 (9 ♀♀, 4 ♂♂), 27.VIII.2002 (5 ♀♀, 2 ♂♂), 22.IX.2002 (6 ♀♀, 4 ♂♂), 25.VI.2003 (10 ♀♀, 5 ♂♂), 26.VIII.2004 (12 ♀♀, 3 ♂♂). **Bitlis** (Ahlat), 27.VI.2002 (4 ♀♀, 2 ♂♂), 27.VIII.2002 (12 ♀♀, 4 ♂♂), 22.IX.2002 (8 ♀♀, 4 ♂♂), 25.VI.2003; (Adilcevaz), 27.VI.2002 (8 ♀♀, 3 ♂♂), 01.VIII.2002 (8 ♀♀, 3 ♂♂), 22.IX.2002 (6 ♀♀, 4 ♂♂), 26.VIII.2004 (6 ♀♀, 2 ♂♂); (Tatvan), 07.VIII.2003 (7 ♀♀,5 ♂♂), 10.VIII.2003 (8 ♀♀), 10.VIII.2003 (15 ♀♀, 9 ♂♂), 15.VIII.2003 (13 ♀♀, 4 ♂♂), 16.VIII.2003 (11 ♀♀, 5 ♂♂), 13.VIII.2004 (14 ♀♀, 6 ♂♂), 26.VIII.2004 (13 ♀♀, 5 ♂♂).

Comments: ***T. urticae*** is a serious pest on many crops and ornamental plants in Turkey and widely distributed all growing areas of Turkey (Düzgüneş, 1977; Güven & Madanlar, 2000). It is known that this species has more than 150 host plants, including most deciduous fruit trees, vegetables and ornamental plants (Düzgüneş, 1977; Düzgüneş & Kılıç, 1983; Güven & Madanlar, 2000; Yanar & Ecevit, 2005). ***T. urticae*** was determined in the all apple orchards which were visited during these surveys (Table 1).

Panonychus ulmi (Koch, 1836)

Material examined: **Van** (Central Province), 30.V.2002 (20 ♀♀, 12 ♂♂), 05.VII.2002 (17 ♀♀, 5 ♂♂), 15.VIII.2002 (25 ♀♀, 8 ♂♂), 20.VIII.2002(8 ♀♀,

4 ♂♂); (Edremit), 17.V.2002 (19 ♀♀, 10 ♂♂), 30.V.2002 (18 ♀♀, 15 ♂♂), 20.VII.2002 (17 ♀♀, 16 ♂♂), 13.IX.2002 (22 ♀♀, 9 ♂♂), 22.IX.2002 (21 ♀♀, 10 ♂♂), 25.V.2003 (15♀♀, 10 ♂♂); (Gevaş), 25.VI.2002 (12 ♀♀, 7 ♂♂), 17.VII.2002 (9 ♀♀, 7 ♂♂), 25.VII.2002 (13 ♀♀, 9 ♂♂), 22.IX.2002 (5 ♀♀, 2 ♂♂); (Erciş), 27.VI.2002 (23 ♀♀, 11 ♂♂), 01.VIII.2002 (15 ♀♀, 8 ♂♂), 27.VIII.2002 (20 ♀♀, 10 ♂♂), 22.IX.2002 (9 ♀♀, 5 ♂♂), 25.VI.2003 (8 ♀♀, 6 ♂♂), 26.VIII.2004 (7 ♀♀, 5 ♂♂). **Bitlis** (Ahlat), 27.VI.2002 (8 ♀♀, 5 ♂♂), 27.VIII.2002 (9 ♀♀), 22.IX.2002 (8 ♀♀, 4 ♂♂), 25.VI.2003; (Adilcevaz), 27.VI.2002 (9 ♀♀, 5 ♂♂), 01.VIII.2002 (7 ♀♀), 22.IX.2002 (5 ♀♀), 26.VIII.2004 (7 ♀♀, 4 ♂♂); (Tatvan), 07.VIII.2003 (5 ♀♀, 3 ♂♂), 15.VIII.2003 (13 ♀♀, 5 ♂♂), 16.VIII.2003 (12 ♀♀, 6 ♂♂), 13.VIII.2004 (16 ♀♀, 8 ♂♂), 26.VIII.2004 (10 ♀♀, 5 ♂♂).

Comments: European red mite, ***P. ulmi*** is a major pest in most deciduous fruit orchards such as pome (apple, pear), stone (plum, peach, chery) fruits, walnut, almond, and vineyards. It is widely distributed in all growing areas of Turkey (Yiğit & Uygun, 1981; İncekulak & Ecevit, 2002; Yanar & Ecevit, 2005). ***P. ulmi*** is one of the major pests in the area, especially in Erciş and Center of Van (Table 1).

Bryobia rubrioculus (Secheuten, 1857)

Material examined: **Van** (Central Province), 30.V.2002 (10 ♀♀), 05.VII.2002 (12 ♀♀), 15.VIII.2002 (2 ♀♀), 20.VIII.2002 (5 ♀♀); (Edremit), 17.V.2002 (20 ♀♀), 30.V.2002 (25 ♀♀), 20.VII.2002 (21 ♀♀), 13.IX.2002 (18 ♀♀), 22.IX.2002 (13 ♀♀), 25.V.2003 (20 ♀♀); (Gevaş), 25.VI.2002 (25 ♀♀), 17.VII.2002 (22 ♀♀), 25.VII.2002 (22 ♀♀), 22.IX.2002 (20 ♀♀); (Erciş), 27.VI.2002 (13 ♀♀), 01.VIII.2002 (23 ♀♀), 27.VIII.2002 (21 ♀♀), 22.IX.2002 (7 ♀♀), 25.VI.2003 (8 ♀♀), 26.VIII.2004 (10 ♀♀). **Bitlis** (Ahlat), 27.VI.2002 (20 ♀♀), 27.VIII.2002 (25 ♀♀), 22.IX.2002 (18 ♀♀), 25.VI.2003 (12 ♀♀); (Adilcevaz) (9 ♀♀), 27.VI.2002 (6 ♀♀), 01.VIII.2002 (5 ♀♀), 22.IX.2002 (12 ♀♀), 26.VIII.2004 (9 ♀♀); (Tatvan), 07.VIII.2003 (4 ♀♀), 10.VIII.2003 (2 ♀♀), 10.VIII.2003 (6 ♀♀), 15.VIII.2003 (5 ♀♀), 16.VIII.2003 (3 ♀♀), 13.VIII.2004 (4 ♀♀), 26.VIII.2004 (6 ♀♀).

Comments: Brown mite, ***B. rubrioculus*** is very common species in Van and Bitlis and also in Turkey. This mite is a major pest of apple, pear, peaches and other deciduous fruit orchards and widely distributed in Turkey (Düzgüneş, 1977; Yiğit & Uygun, 1981; Uysal et al., 2001; İncekulak & Ecevit, 2002; Yanar & Ecevit, 2005; Kasap & Çobanoğlu, 2006). ***B. rubrioculus*** was heavily populated from the samples Edremit and Ahlat (Table 1).

Eotetranychus carpini (Oudemans, 1905)

Material examined: **Van** (Gevaş), 22.IX.2002 (13 ♀♀, 5 ♂♂). **Bitlis** (Adilcevaz), 26.VIII.2004 (10 ♀♀, 4 ♂♂).

Comments: Yellow spider mites is a pest on apple, hazelnut, oaks, willow and maple trees (Jeppson et al., 1975). This species was reported from chestnuts in İzmir (Önuçar & Ulu, 1988) and woody ornamental plants and recreation areas in Ankara (Uysal et al., 2001). This is a rare species. It was collected from the samples of Gevaş and Adicevaz during the studies (Table 1).

Eotetranychus uncatus Garman, 1952

Material examined: **Bitlis** (Adilcevaz), 26.VIII.2004 (17 ♀♀, 5 ♂♂).

Comments: ***E. uncatus*** lives on apple, hazelnut, oaks, willow and maple. ***E. uncatus*** is a serious pest of apple and stone fruits in Eastern USA (Jeppson et al., 1975). This species is rarely occurs in the apple growing areas in Turkey. It was collected from fruit trees and found from the collection in 1963 in Ankara previously (Düzgüneş, 1963) and reported on apple in Tokat (Yanar & Ecevit, 2005). ***E. uncatus*** was determined only in Adilcevaz during the surveys (Table 1).

Table 1. Pest and neutral mite species in the apple orchards of around Van Lake

Species	Center	Edremit	Gevaş	Erciş	Adilcevaz	Ahlat	Tatvan
Acari: Tetranychidae							
Amphitetranychus viennensis	+	+	+	+	+	+	+
Tetranychus urticae	+	+	+	+	+	+	+
Panonychus ulmi	+	+	+	+	+	+	+
Byrobia rubrioculus	+	+	+	+	+	+	+
Eotetranychus uncatus	-	-	-	-	+	-	-
Eotetranychus carpini	-	-	+	-	+	-	-
Acari: Eriophyidae							
Aculus schlectendali	+	+	+	+	+	+	+
Acari: Tenuipalpidae							
Cenopalpus pulcher	+	+	+	+	+	+	+
Neutral mite species							
Acari: Tydeidae							
Tydeus californicus	+	+	+	+	+	+	+

(+: Present, -: Absent).

Tenuipalpidae

Cenopalpus pulcher Canestrini and Franzago, 1876

Material examined: **Van** (Central Province), 30.V.2002(23 ♀♀), 15.VIII.2002(11 ♀♀); (Edremit), 17.V.2002 (20 ♀♀, 3 ♂♂), 20.VII.2002 (11 ♀♀), 13.IX.2002 (10 ♀♀, 2 ♂♂), 25.V.2003 (8 ♀♀, 2 ♂♂); (Gevaş), 25.VI.2002 (9 ♀♀,

3 ♂♂), 17.VII.2002 (10 ♀♀), 22.IX.2002 (5 ♀♀, 2 ♂♂); (Erciş), 27.VI.2002 (10 ♀♀), 01.VIII.2002 (5 ♀♀), 27.VIII.2002 (8 ♀♀, 2 ♂♂), 22.IX.2002 (7 ♀♀, 2 ♂♂), 25.VI.2003 (5 ♀♀,1 ♂♂), 26.VIII.2004 (5 ♀♀). **Bitlis** (Ahlat), 27.VI.2002 (6 ♀♀), 27.VIII.2002 (9 ♀♀, 2 ♂♂), 22.IX.2002 (7 ♀♀), 25.VI.2003 (8 ♀♀, 2 ♂♂); (Adilcevaz), 27.VI.2002 (7 ♀♀, 3 ♂♂), 01.VIII.2002 (7 ♀♀, 4 ♂♂), 22.IX.2002 (10 ♀♀), 26.VIII.2004 (7 ♀♀); (Tatvan), 07.VIII.2003 (11 ♀♀, 3 ♂♂), 10.VIII.2003 (8 ♀♀), 15.VIII.2003 (7 ♀♀), 13.VIII.2004 (9 ♀♀), 26.VIII.2004 (12 ♀♀).

Comments: This false spider mite is an occasional pest in apple, pear, prune and walnut trees and widely distributed in the all growing areas in Turkey (Göksu, 1967; Düzgüneş, 1977; Yiğit & Uygun, 1981; İncekulak & Ecevit, 2002; Yanar & Ecevit, 2005). ***C. pulcher*** was frequently found in the all apple orchards of these regions (Table 1).

Eriophyidae

Aculus schlectendali (Nalepa, 1905)

Material examined: **Van (Central Province)**, 30.V.2002 (10 ♀♀), 05.VII.2002 (8 ♀♀), 15.VIII.2002 (7 ♀♀); (Edremit), 17.V.2002 (7 ♀♀), 30.V.2002 (14 ♀♀), 21.VII.2002 (4 ♀♀), 13.IX.2002 (4 ♀♀), 25.V.2003 (15 ♀♀); (Gevaş), 25.VI.2002 (11 ♀♀), 17.VII.2002 (9 ♀♀), 22.IX.2002 (14 ♀♀); (Erciş), 27.VI.2002 (5 ♀♀), 01.VIII.2002 (4 ♀♀), 27.VIII.2002 (6 ♀♀), 22.IX.2002 (14 ♀♀), 25.VI.2003 (5 ♀♀), 26.VIII.2004 (4 ♀♀). **Bitlis** (Ahlat), 27.VI.2002 (7 ♀♀), 27.VIII.2002 (11 ♀♀), 22.IX.2002 (14 ♀♀), 25.VI.2003 (6 ♀♀); (Adilcevaz), 27.VI.2002 (7 ♀♀), 01.VIII.2002 (6 ♀♀), 22.IX.2002 (5 ♀♀), 26.VIII.2004 (6 ♀♀); (Tatvan), 07.VIII.2003 (8 ♀♀), 10.VIII.2003 (6 ♀♀), 16.VIII.2003 (11 ♀♀), 13.VIII.2004 (16 ♀♀), 26.VIII.2004 (5 ♀♀).

Comments: ***A. schlectendali*** is a serious pest of apple and widely distributed in the all growing areas of Turkey (İncekulak & Ecevit, 2002; Yanar & Ecevit, 2005). It was determined in the all apple orchards visited during the surveys (Table 1).

Predatory mites

Phytoseiidae

Kampimodromus aberrans (Oudemans, 1930)

Material examined: **Van** (Central Province), 30.V.2002 (24♀♀, 6♂♂), 05.VII.2002 (17♀♀, 5♂♂), 15.VIII.2002 (12♀♀, 3♂♂), 20.VII.2002 (17♀♀, 5♂♂); (Edremit), 17.V.2002 (8♀♀, 2♂♂), 30.V.2002 (64♀♀, 16♂♂), 16.VII.2002 (13♀♀); 13.IX.2002 (9♀♀), 22.IX.2002 (41♀♀, 11♂♂); (Gevaş), 17.VI.2002 (33♀♀, 17♂♂), 25.VI.2003 (31♀♀, 5♂♂), 25.VII.2002 (44♀♀, 21♂♂), 22.IX.2002 (5♀♀, 1♂); (Erciş), 27.VI.2002 (6♀♀), 01.VIII.2002 (10♀♀), 22.IX.2002 (6♀♀, 1♂). **Bitlis (**Ahlat), 01.VIII.2002 (16♀♀), 15.VIII.2003 (5♀♀), 22.IX.2002 (29♀♀, 5♂♂); (Adilcevaz), 01.VIII.2002 (4♀♀), 22.IX.2002 (4♀♀);

(Tatvan), 10.VIII.2003 (35♀♀, 7♂♂), 17.VIII.2003 (23♀♀, 7♂♂), 07.IX.2003 (9♀♀), 21.IX.2003 (9♀♀).

Comments: ***K. aberrans*** is very common on various plants such as apple, hazelnut and pear in all regions of Turkey (Swirski & Amitai, 1982; Düzgüneş & Kılıç, 1983, İncekulak & Ecevit, 2002; Yanar & Ecevit, 2005). It was determined with the colonies of Eriophyidae, Tarsenomidae and Tenuipalpidae (Çobanoğlu, 2004). It is found with the members of Tetranychidae and Tydeidae in the all apple orchards visited during the surveys (Table 2).

Euseius finlandicus (Oudemans, 1915)

Material examined: **Van** (Central Province), 30.V.2002 (12♀♀, 2♂♂), 05.VII.2002 (7♀♀), 15.VIII.2002 (21♀♀, 5♂♂), 20.VIII.2002 (11♀♀, 3♂♂); (Edremit), 30.V.2002 (17♀♀, 3♂♂), 13.IX.2002 (5♀♀), 22.IX.2002 (26♀♀, 8♂♂); (Gevaş), 17.VI.2002 (18♀♀, 8♂♂), 25.VII.2002 (21♀♀, 3♂♂). **Bitlis** (Ahlat), 01.VIII.2002 (2♀♀), 22.IX.2002 (2♀♀); (Adilcevaz), 01.VIII.2002 (5♀♀, 2♂♂); (Tatvan), 10.VIII.2003 (21♀♀, 7♂♂), 17.VIII.2003 (12♀♀, 5♂♂), 07.IX.2003 (1♀), 21.IX.2003 (2♀♀).

Comments: ***E. finlandicus*** was collected from all regions of Turkey (Swirski & Amitai, 1982; Düzgüneş & Kılıç,1983; Şekeroğlu, 1984; Çobanoğlu, 2004). It is widespread in all regions of Turkey on various plants such as apple, hazelnut, pear, citrus and grape (Düzgüneş & Kılıç, 1983; Şekeroğlu, 1984; Çobanoğlu, 1989; İncekulak & Ecevit, 2002; Yanar & Ecevit, 2005). ***E. finlandicus*** was determined with the colonies of Tetranychidae, Eriophyidae, Tarsenomidae, Tydeidae and some specimens also were reported on thrips (Çobanoğlu, 2004). It was observed in all apple orchards which was visited during the surveys, except Erciş (Table 2).

Amblyseius agrestris (Karg, 1961)

Material examined: **Van** (Edremit), 30.V.2002 (2♀♀).

Comments: ***A. agrestris*** was determined in apple orchards in Burdur and Ankara (Düzgüneş & Kılıç, 1983), Amasya (İncekulak & Ecevit, 2002) and Tokat (Yanar & Ecevit, 2005). In this study, ***A. agrestris*** was determined with the colonies of ***B. rubrioculus*** and ***A. viennensis*** in Edremit (Table 2).

Typhlodromus cotoneastri Wainstein, 1961

Material examined: **Bitlis** (Tatvan), 13.VIII.2004 (18♀♀, 2♂♂).

Comments: ***T. cotoneastri*** was determined in Thrace and Marmara Region of Turkey on apple, cherry, pear (Düzgüneş & Kılıç, 1983; Çobanoğlu, 2004). In this study, it was determined with the colonies of ***B. rubrioculus*** and ***C. pulcher*** in Tatvan (Table 2).

Paraseiulus talbii Athias- Henriot, 1960

Material examined: **Van** (Ederemit), 30.V.2002 (4♀♀)

Comments: ***P. talbii*** was widely distributed in all growing areas of Turkey, except Black Sea Region (Çobanoğlu, 1989 and 1992). It was found in low numbers during the surveys. ***P. talbii*** was determined together with the colonies of ***B. rubrioculus*** and ***A. viennensis*** in Edremit (Table 2).

Paraseiulus triporus Chant and Yoshida-Shaul, 1982

Material examined: **Van** (Erciş), 22.IX.2002 (6♀♀); (Edremit), 30.V.2002 (4♀♀, 1♂),

25.VI.2003 (4♀♀).

Comments: ***P. triporus*** was reported from apple orchards for the first time in Tekirdağ and Edirne (Çobanoğlu, 2004). ***P. triporus*** was found together with the colonies of ***B. rubrioculus***, ***A. viennensis***, ***A. schlectendali*** and ***Z. mali*** in Erciş and Edremit in this study (Table 2).

Anthoseius kazachistanicus Wainstein, 1958

Material examined: **Bitlis** (Tatvan), 13.VIII.2004 (1♀).

Comments: ***A. kazachistanicus*** was previously reported from apple trees in Erzurum (Ecevit, 1977). This mite was found in the colonies of ***B. rubrioculus***, ***T. californicus*** and ***Z. mali*** in Tatvan (Table 2).

Anthoseius tranquillus (Livshitz and Kuznetzov, 1972)

Material examined: **Van** (Center), 20.VIII.2002 (1♀); (Gevaş), 25.VII.2002 (1♀), 22.IX.2002 (2♀♀); (Edremit), 25.VI.2003 (1♀). **Bitlis** (Tatvan), 13.VIII.2004 (18♀♀, 2♂♂).

Comments: ***A. tranguillus*** was collected on apple leaves from Ankara (Çobanoğlu, 1997). During this study, it was determined in the colonies of ***B. rubrioculus*** and ***A. viennensis*** in Gevaş, Edremit, central of Van and Tatvan (Table 2).

Stigmaeidae

Zetzellia mali (Ewing, 1917)

Material examined: **Van** (Central Province), 30.V.2002 (14♀♀, 3♂♂), 05.VII.2002 (4♀♀, 1♂), 18.VIII.2002 (8♀♀); (Edremit), 17.V.2002 (5♀♀), 20.VII.2002 (2♀♀, 1♂), 13.IX.2002 (7♀♀, 3♂♂), 25.V.2003 (5♀♀); (Gevaş), 25.VI.2002 (2♀♀), 17.VII.2002 (2♀♀), 22.IX.2002 (3♀♀); (Erciş), 27.VI.2002 (5♀♀), 01.VIII.2002 (9♀♀, 2♂♂), 22.IX.2002 (4♀♀), 25.VI.2003 (5♀♀, 1♂), 26.VIII.2004 (3♀♀, 1♂). **Bitlis** (Ahlat), 27.VI.2002 (4♀♀, 1♂), 22.IX.2002 (1♀), 25.VI.2003 (2♀♀); (Adilcevaz), 27.VI.2002 (3♀♀, 1♂), 22.IX.2002 (4♀♀), 26.VIII.2004 (2♀♀); (Tatvan), 07.VIII.2003 (3♀♀, 1♂), 15.VIII.2003 (8♀♀, 3♂♂), 13.VIII.2004 (1♀).

Comments: This mite species feed on the eggs of tetranychid and eriophyid mites (Çobanoğlu & Kazmierski, 1999). ***Z. mali*** was obtained in ***Tetranychus*** spp. colonies from woody ornamental plants in Ankara (Çobanoğlu *et* al., 2003). This mite is an important predator of ***B. rubrioculus***, ***A. viennensis***, ***T. urticae*** and ***A. schlectendali***, but it doesn't enough activity for keeping their prey population levels under the economic threshold. During this study, ***Z. mali*** is obtained with the colonies of ***B. rubrioculus***, ***A. viennensis***, ***P. ulmi***, Tydeid and Phytoseiid species in the all apple orchards (Table 2).

Table 2. Predatory mite species in the apple orchards of around Van Lake

Species	Center	Edremit	Gevaş	Erciş	Adilcevaz	Ahlat	Tatvan
Acari: Phytoseiidae							
Kampimodromus aberrans	+	+	+	+	+	+	+
Euseius finlandicus	+	+	+	-	+	+	+
Amblyseius agrestris	-	+	-	-	-	-	-
Paraseiulus talbii	-	+	-	-	-	-	-
Anthoseius tranguillus	+	+	+	-	-	-	+
Typhlodromus cotoneastri	-	-	-	-	-	-	+
Paraseiulus triporus	-	+	-	+	-	-	-
Anthoseius kazachistanicus	-	-	-	-	-	-	+
Acari: Stigmaeidae							
Zetzellia mali	+	+	+	+	+	+	+

(+: Present, -: Absent).

Neutral species

Tydeidae

Tydeus californicus (Banks, 1904)

Material examined: **Van** (Central Province), 30.V.2002 (4♀♀), 05.VII.2002 (3♀♀), 18.VIII.2002 (4♀♀); (Edremit), 17.V.2002 (2♀♀), 20.VII.2002 (5♀♀), 13.IX.2002 (7♀♀), 25.V.2003 (5♀♀); (Gevaş), 25.VI.2002 (1♀), 17.VII.2002 (2♀♀), 22.IX.2002 (3♀♀); (Erciş), 27.VI.2002 (6♀♀), 01.VIII.2002 (9♀♀), 22.IX.2002 (3♀♀), 25.VI.2003 (5♀♀), 26.VIII.2004 (3♀♀). **Bitlis** (Ahlat), 27.VI.2002 (4♀♀), 22.IX.2002 (3♀♀), 25.VI.2003 (8♀♀); (Adilcevaz), 27.VI.2002 (3♀♀), 22.IX.2002 (4♀♀), 26.VIII.2004 (8♀♀); (Tatvan), 07.VIII.2003 (4♀♀), 15.VIII.2003 (5♀♀), 13.VIII.2004 (2♀♀).

Comments: This mite is fast-moving, soft bodied and yellowish small mites. It is very common on plants and probably feeding on eggs of spider mites, fungi, honeydew etc. and it has minor importance as a plant feeder (Baker, 1970). Also,

this mite is important as alternative food to phytoseiids in the orchards (Göven et al., 2002). In Turkey, it was reported for the first time by Düzgüneş (1963) and later by Cobanoğlu (1992) from hazel trees and various pome and stone fruit trees all around Turkey (Çobanoğlu & Kazmierski, 1999). ***T. californicus*** was obtained in the colonies of ***B. rubrioculus***, ***A. viennensis***, ***P. ulmi***, Phytoseiid and Stigmaeid mites in the all apple orchards (Table 1).

Discussion

In this study, the eighteen mite species were determined in the region. The eight pest mite species were determined to be members of Tetranychidae (***A. viennensis***, ***T. urticae***, ***P. ulmi***, ***B. rubrioculus***, ***E. uncatus*** and ***E. carpini***), Eriophyidae (***A. schlectendali***) and Tenuipalpidae (***C. pulcher***) families. ***A. viennensis*** is the most important pest mite species in the region. ***T. urticae***, ***P. ulmi***, ***B. rubrioculus*** and ***A. schlectendali*** are the other important pest mite species in the all apple orchards which was visited during the surveys (Table 1).

In addition, the nine predaceous species were found in the region. Phytoseiidae family is the most important predaceous group including eight species. The most common phytoseiid species were ***K. aberrans*** (26.8%), ***E. finlandicus*** (11.6%), ***P. triporus*** (5.4%), ***A. tranguillus*** (3.6%), respectively (Table 3). Some species had very low frequencies, such as ***A. agrestris***, ***P. talbii***, ***T. cotoneastri*** and ***A. kazachistanicus*** which were obtained from only one sample (0.9%) in the region (Table 3). Other predatory species is ***Z. mali*** from Stigmaeidae. ***Z. mali*** is one of the common predaceous mite species in the apple orchards of around Van Lake (Table 2). Also, one neutral species (***T. californicus***) from Tydeidae were found in the region.

These mite species have been reported from Van Lake basin firstly. We regard that this study is a preliminary step in the description of mite fauna of around Van Lake area.

Table 3. Frequencies of phytoseiid species in the apple orchards of around Van Lake (%= percentage of the positive samples in 112 samples examined)

Species	Positive Number	Samples (%)	Number of individuals
Kampimodromus aberrans	30	26.8	470 ♀♀; 113 ♂♂
Euseius finlandicus	13	11.6	183 ♀♀; 53 ♂♂
Amblyseius agrestris	1	0.9	2 ♀♀
Paraseiulus triporus	6	5.4	14 ♀♀; 1 ♂
Anthoseius tranguillus	4	3.6	23 ♀♀; 2 ♂♂
Typhlodromus cotoneastri	1	0.9	18 ♀♀; 2 ♂♂
Anthoseius kazachistanicus	1	0.9	1 ♀
Paraseiulus talbi	1	0.9	4 ♀♀

Özet

Van Gölü çevresinde elma üretim alanlarının akar (Acarina) faunası

Bu çalışma, Van Gölü havzasında yetişen elma bahçelerindeki zararlı ve yararlı akar türlerini saptamak amacı ile 2002-2004 yılları arasında yürütülmüştür. Bu sürveyler sonucunda Tetranychidae familyasından 6, Eriophyidae familyasından 1, Tenuipalpidae familyasından 1 olmak üzere 8 zararlı, Phytoseiidae familyasından 8, Stigmaeidae familyasından 1 olmak üzere 9 yararlı ve Tydeidae familyasından 1 nötr tür olmak üzere toplam 18 akar türü saptanmıştır. Zararlı akar türleri içerisindeki, ***Amphitetranychus viennensis*** (Zacher) (Acari: Tetranychidae), tüm elma bahçelerinde saptanmış ve en önemli tür olarak dikkati çekmiştir. Avcı türlerden, Phytoseiidae familyası içerisinde yer alan ***Kampimodromus aberrans*** (Oudemans) ve ***Euseius finlandicus*** (Oudemans) ile Stigmaeidae familyasından ***Zetzellia mali*** (Ewing) bölgedeki elma bahçelerinde en yaygın olarak görülen türlerdir.

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