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Original article (Orijinal araştırma)

Mite diversity and population dynamics of eriophyid mites on olive trees in Western Turkey[1]

Türkiye'nin batısında zeytin ağaçlarında akar çeşitliliği ve eriophyid akarların popülasyon dalgalanması

Firdevs ERSIN[2] Serkan KAPTAN[3] Latife ERTEN[3] Halil KOKTURK[3]

Bulent GUMUSAY[3] Evsel DENIZHAN[4] Ibrahim CAKMAK[5*]

Abstract

A study was conducted to determine the diversity of phytophagous mites and their predators in olive orchards in Balikesir, Izmir and Manisa Provinces, Turkey from 2015 to 2017. Also, the population density of eriophyid mites was detected in four olive orchards in Izmir and Manisa in 2016 and 2017. As a result, sixteen species were collected, namely, *Aceria oleae* (Nalepa, 1900), *Tegolophus hassani* (Keifer, 1959) (Eriophyidae), *Cenopalpus lineola* (Canestrini & Fanzago, 1876), *Brevipalpus* sp. (Tenuipalpidae), *Amblyseius andersoni* Chant, 1957*, Euseius stipulatus* (Athias-Henriot, 1960)*, Neoseiulus barkeri* Hughes, 1948*, Paraseiulus talbii* (Athias-Henriot, 1960)*, Typhlodromus athenas* Swirski & Ragusa, 1976*, Typhlodromus athiasae* Porath & Swirski, 1965, *Typhlodromus psyllakisi* Swirski & Ragusa, 1976*, Typhlodromus rarus* Wainstein, 1961*, Typhlodromus recki* Wainstein, 1958 (Phytoseiidae), *Raphignathus gracilis* (Rack, 1962) (Raphignathidae), *Agistemus duzgunesae* Koc, Cobanoglu & Madanlar, 2005 (Stigmaeidae) and *Tydeus californicus* (Banks, 1904) (Tydeidae). *Aceria oleae* and *T. hassani* were found throughout the growing period from April to November in all orchards and they reached their highest population densities on buds during April, and leaves and fruit during May and June. *Typhlodromus athenas* was observed throughout the year in the majority of the orchards, and this is a first record of this species for the Turkish fauna. It was observed that *A. duzgunesae* also fed on eriophyid mites. Further studies are needed to investigate prey range of the predatory mites, *T. athenas* and *A. duzgunesae* and their potential as biological control agents of eriophyid mites.

Keywords: Eriophyidae, mites, olive, Phytoseiidae, Turkey

Öz

Bu çalışmada 2015-2017 yıllarında Balıkesir, İzmir ve Manisa illerinde zeytinde zarar yapan akar türleri ve predatörlerinin belirlenmesi amaçlanmıştır. Ayrıca, eriophyid akarların popülasyon yoğunlukları 2016 ve 2017 yıllarında Izmir ve Manisa'da dört adet zeytin bahçesinde belirlenmiştir. Sonuç olarak on altı tür saptanmıştır: *Aceria oleae* (Nalepa, 1900),*Tegolophus hassani* (Keifer, 1959) (Eriophyidae), *Cenopalpus lineola* (Canestrini & Fanzago, 1876) and *Brevipalpus* sp. (Tenuipalpidae), *Amblyseius andersoni* Chant, 1957*, Euseius stipulatus* (Athias-Henriot, 1960)*, Neoseiulus barkeri* Hughes, 1948*, Paraseiulus talbii* (Athias-Henriot, 1960)*, Typhlodromus athenas* Swirski & Ragusa, 1976*, Typhlodromus athiasae* Porath & Swirski, 1965, *Typhlodromus psyllakisi* Swirski & Ragusa, 1976*, Typhlodromus rarus* Wainstein, 1961*, Typhlodromus recki* Wainstein, 1958 (Phytoseiidae), *Raphignathus gracilis* (Rack, 1962) (Raphignathidae), *Agistemus duzgunesae* Koc, Cobanoglu & Madanlar, 2005 (Stigmaeidae) ve *Tydeus californicus* (Banks, 1904) (Tydeidae). *Aceria oleae* ve *T. hassani*'ye örnekleme yapılan tüm bahçelerde nisan ayından kasım ayına kadar tüm vejetasyon boyunca rastlanılmış ve en yüksek popülasyon yoğunluğu nisan ayında tomurcuklarda, mayıs ve haziran aylarında yaprak ve meyvelerde saptanmıştır. *Typhlodromus athenas*, örnekleme yapılan bahçelerin büyük çoğunluğunda yıl boyunca yaygın olarak gözlenmiş ve Türkiye'de varlığı ilk kez bu çalışmayla saptanmıştır. Bununla birlikte *A. duzgunesae*'nin eriophyid akarlarla beslendiği gözlenmiştir. Daha sonra yapılacak çalışmalarda avcı akarlar, *T. athenas* ve *A. duzgunesae*'nin av yelpazesinin belirlenmesi ve bunların eriophyid akarlar üzerinde biyolojik mücadele etmeni olarak potansiyellerinin ortaya çıkarılması gerekmektedir.

Anahtar sözcükler: Eriophyidae, akar, zeytin, Phytoseiidae, Türkiye

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[2] Ege University, Agricultural Faculty, Plant Protection Department, 35100, Izmir, Turkey
[3] Olive Research Institute, 35100, Izmir, Turkey
[4] Trakya University, Faculty of Science, Department of Biology, 22030, Edirne, Turkey
[5] Aydin Adnan Menderes University, Faculty of Agriculture, Department of Plant Protection, 09010, Aydin, Turkey
* Corresponding author (Sorumlu yazar) e-mail: icakmak@adu.edu.tr

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Introduction

Due to the positive effects of olive oil on human nutrition and health, olive production is increasing in Turkey as well as all over the world. Olive is produced economically in 37 countries around the world, especially in Spain, Greece, Italy, Turkey, Morocco, Egypt and Tunisia (FAO, 2017). Olive trees are a major agricultural crop in the Aegean Region, Turkey where they are mostly grown in Balikesir, Izmir and Manisa Provinces for olive oil and table olive production. There are many factors, including pests and diseases, that limit the production of olives.

Mites have been found to cause significant damage in olive production areas over the last decade (Kacar et al., 2010; Leiva et al., 2013). They are found on the leaves, buds, flowers and fruit of the olive tree and cause greenish-yellow spots on old leaves and deformations on young leaves; dark green depressions and rust spots on buds; abnormal formations, brown cracked areas and whitish, silvery colored parts on fruit (Cetin & Alaoglu, 2006; Kacar et al., 2010). Jardak et al. (2007) showed that mites, which were previously regarded as secondary pests, caused significant damage in some olive regions for the last 20 years, reduced the olive oil yield by up to 46%, and increased the acidity of olive oil by decreasing the chlorophyll and polyphenol content. Leiva et al. (2013) reported that mites in olives cause up to 20% economic loss due to deformation in leaves and fruit.

Some members of the superfamilies Eriophyoidea and Tetranychoidea (Acari: Prostigmata) are pests of olives and are either monophagous or oligophagous. Thirty species, including 12 species in Eriophyidae, 17 species in Tenuipalpidae and one species in Tetranychidae, have been detected in olive trees worldwide to date (Tzanakakis, 2003). Eriophyid mites are economically pest species in olive (Jardak et al., 2007). Many species of eriophyid mites are known to be specific to their host and 10 species have been recorded only on olives (Tzanakakis, 2003). *Phytoptus* (*Aceria*) *oleae* (Nalepa, 1900) (Acari: Eriophyidae) was determined in the first studies on the mite species in olive trees in Turkey (Iyriboz, 1938; Bodenheimer, 1941; Iyriboz, 1968). Kumral & Kovancı (2004) reported seven mite species (2 phytophagous, 2 predators and 3 neutral) were found in olive orchards in Bursa Province and *A. oleae*, *Typhlodromus involutus* Livshitz & Kuznetsov, 1972 (Acari: Phytoseiidae) and *Brevipalpus oleae* Baker, 1949 (Acari: Tenuipalpidae) were present at high densities. *Aceria oleae* and *Aculus olearius* Castagnoli, 1977 (Acari: Eriophyidae) were found in olives in Mersin (Mut) (Cetin & Alaoglu, 2006). Kacar et al. (2010) found *A. oleae* and *Tegolophus hassani* (Keifer, 1959) (Acari: Eriophyidae) in olive trees in the Eastern Mediterranean Region of Turkey. Kumral et al. (2010) found two phytophagous mites, *B. oleae* and *A. oleae*, and seven predatory mites, *Typhlodromus athiasae* Porath & Swirski, 1965, *Typhlodromus recki* Wainstein, 1958, *T. involutus*y (Phytoseiidae), *Cheletogenes ornatus* (Canestrini & Fanzago, 1876) (Cheyletidae), *Zetzellia* sp. (Stigmaeidae), *Pronematus ubiquitus* (McGregor, 1932) (Tydeidae), and *Erythraeus* sp. (Erythraeidae) on olive trees in Bursa, Turkey. Also, *A. oleae* and *A. olearius* were determined on fruit of olive in the Aegean Region of Turkey (Cetin et al., 2012). Very few studies have been conducted on mites in olive trees in Turkey and only a small number of mite species have been reported in Turkey compared to the literature (Tzanakakis, 2003; Jardak et al., 2007). Therefore, this study was conducted to determine the diversity of phytophagous mites, their predators and the population dynamics of eriophyid mites that occur in olive orchards in the Balikesir, Izmir and Manisa Provinces, Turkey.

Materials and Methods

Phytophagous mites and their predators on olive trees

A survey was conducted to determine phytophagous mites and their predators on olive orchards in Balikesir, Izmir and Manisa Provinces, Turkey from 2015 to 2017. Orchards were regularly visited every month between March and December (twice a month in spring and autumn) in 2015. Additional, non-periodic samplings were performed in 2016 and 2017. Each orchard was sampled by collecting 150 leaves, fruit and buds from different sides of the trees (Table 1). Samples were placed into polyethylene bags and brought to the laboratory within an ice chest. Each sample was divided into three sets of plant material

(buds, leaves and fruit) that were either directly examined under the stereomicroscope (30X, Leica EZ4, Wetzlar, Germany) or put into Berlese funnels to extract mites. All mites found in the samples were placed in Eppendorf tubes containing 70% ethanol. Afterward, mites were cleared in a lacto-phenol solution, and then mounted in Hoyer's medium (Dizlek et al., 2019). Slides were dried at 45-50°C for 3-4 d on a hot plate (Termal N11153C, Istanbul, Turkey). Identification of the mite species was done by Ismail Doker (Turkey) for Phytoseiidae, Farid Faraji (The Netherlands) for Phytoseiidae, Tenuipalpidae, Tydeidae, Salih Dogan (Turkey) for Raphignathidae, Stigmaeidae and one of the authors (Evsel Denizhan) for Eriophyidae. The voucher specimens of species were deposited in the mite collection of Ibrahim Cakmak at the Department of Plant Protection, University of Aydin Adnan Menderes, Turkey.

Table 1. Number of olive trees and orchards sampled in the surveyed provinces and districts in Turkey

Province	District	Number of trees ($x10^6$)	Number of orchards sampled
Balikesir (I)*	Ayvalik (a), Burhaniye (b), Edremit (c), Gomec (d), Havran (e)	9.2	19
Izmir (II)	Aliaga (a), Bergama (b), Bayindir (c), Bornova (d) Dikili (e), Foca (f), Kemalpasa (g), Menderes (h), Odemis (i), Selcuk (j), Seferihisar (k), Tire (l), Torbali (m), Urla (n)	15.7	31
Manisa (III)	Akhisar (a), Ahmetli (b), Belen (c), Kirkagac (d), Merkez (e), Saruhanli (f), Soma (g), Salihli (h)	17.3	35
Total		52.2	85

* Codes in parentheses are used to reference these districts in the below.

Population density of eriophyid mites

The population density of eriophyid mites was determined in four olive (cv. Ayvalik) orchards, two orchards in Izmir (Bornova and Kemalpasa), two orchards in Manisa (Akhisar and Saruhanli). Weekly sampling was done between March and November in 2016 and 2017. In each orchard, 30 leaves, 30 buds and 30 fruit were randomly collected from different sides of the trees at 1-1.25 m height. The collected leaf, bud and fruit samples were wrapped with paper and put in polyethylene bags. They were brought in an icebox to the laboratory and kept in the refrigerator at 4°C. Eriophyid mites on the leaves, buds and fruit were counted separately under a stereomicroscope (Soif MD90, Shanghai, China). All sampled orchards were pesticide-free. The average temperature and relative humidity in the four districts sampled in 2016 and 2017 are given in Figure 1.

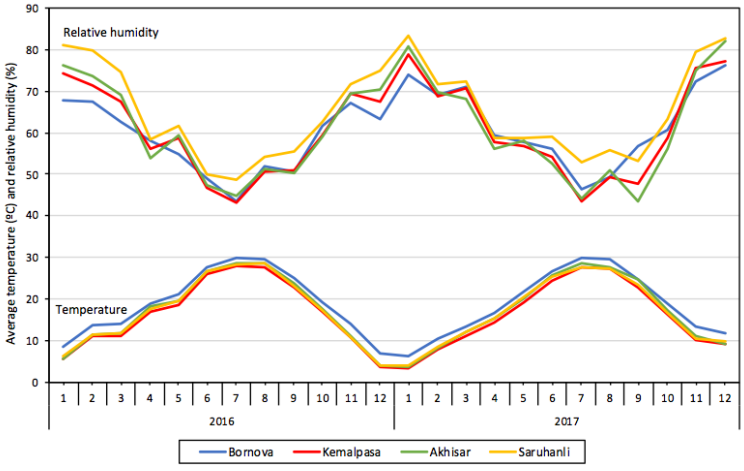

Figure 1. Mean temperature and relative humidity values in four districts sampled in 2016 and 2017.

Results

Phytophagous mites and their predators on olive trees

Four phytophagous mites, *Aceria oleae*, *T. hassani* (Eriophyidae), *C. lineola* and *Brevipalpus* sp. (Tenuipalpidae); eleven predatory mites, *Amblyseius andersoni* Chant, 1957, *Euseius stipulatus* (Athias-Henriot, 1960), *Neoseiulus barkeri* Hughes, 1948, *Paraseiulus talbii* (Athias-Henriot, 1960), *Typhlodromus (Anthoseius) athenas* Swirski & Ragusa, 1976, *T. (Anthoseius) psyllakisi* Swirski & Ragusa 1976, *T. (Anthoseius) rarus* Wainstein, 1961, *T. (Anthoseius), T. (Typhlodromus) athiasae* (Phytoseiidae), *Raphignathus gracilis* (Rack, 1962) (Raphignathidae) and *Agistemus duzgunesae* Koc, Cobanoglu & Madanlar, 2005 (Stigmaeidae); one neutral mite, *Tydeus californicus* (Banks, 1904) (Tydeidae) were detected in the olive orchards sampled (Table 2).

Eriophyid mites, *A. oleae* and *T. hassani* were found in all locations of Balikesir, Manisa and Izmir Provinces in spring (April and May) and autumn (September and October) in 2015, 2016 and 2017 (Table 1). Both mite species were found in mixed populations and they occurred greenish-yellow spots and malformation of leaves, rust spots on buds and malformation of fruit (Figure 2). Tenuipalpid mites, *C. lineola* and *Brevipalpus* sp. were detected from one location in Izmir and nine locations from Balikesir, Manisa and Izmir Provinces, respectively. No damage to olive trees caused by tenuipalpid mites was observed. Phytoseiidae species were the most common predatory mites. *Typhlodromus athenas* was commonly observed throughout the year in the majority of the olive orchards, and this species is a first record for the Turkish fauna. *Agistemus duzgunesae* was recorded from 11 locations in Balikesir, Manisa and Izmir Provinces, and *A. duzgunesae* was observed to feed on eriophyid mites.

Table 2. Mite species obtained from olive orchards in Balikesir, Izmir and Manisa

Family	Species	Locality* (as referred in Table 1)
Eriopyhidae	*Aceria oleae*	I (a, b, c, d, e), II (a, b, c, d, e, f, g, h, i, j, k, l, m, n), III (a, b, c, d, e, f, g, h)
	Tegolophus hassani	I (a, b, c, d, e), II (a, b, c, d, e, f, g, h, i, j, k, l, m, n), III (a, b, c, d, e, f, g, h)
Tenuipalpidae	*Cenopalpus lineola*	II (b)
	Brevipalpus sp.	I (a, c, d, e), II (b, c, l), III (a, f)
Phytoseiidae	*Amblyseius andersoni*	II (f)
	Euseius stipulatus	I (c)
	Neoseiulus barkeri	I (a), II (c)
	Paraseiulus talbii	II (d)
	*Typhlodromus (Anthoseius) athenas***	I (a, b, c, d, e), II (a, b, d, g, k, j, m, o), III (a, c, d, e, f, g, h)
	Typhlodromus(Anthoseius) psyllakisi	I (c), II (b, d, g)
	Typhlodromus (Anthoseius) rarus	I (b), II (f), III (e, f, h)
	Typhlodromus (Anthoseius) recki	I (a), II (c, l)
	Typhlodromus(Typhlodromus) athiasae	I (c), II (b, c, g, l, n), III (a, b, c, e)
Raphignathidae	*Raphignathus gracilis*	II (b, d, g), III (a)
Stigmaeidae	*Agistemus duzgunesae*	I (b, c, e), II (b, d, g, j, l), III (a, f, h)
Tydeidae	*Tydeus californicus*	I (a, b, c, d), II (b, d, e, g, l), III (a, e, f)

* (I) Balikesir, (a) Ayvalik, (b) Burhaniye, (c) Edremit, (d) Gomec, (e) Havran; (II) Izmir, (a) Aliaga, (b) Bergama, (c) Bayindir, (d) Bornova, (e) Dikili, (f) Foca, (g) Kemalpasa, (h) Menderes, (i) Odemis, (j) Selcuk, (k) Seferihisar, (l) Tire (m) Torbali, (n) Urla; (III) Manisa, (a) Akhisar, (b) Ahmetli, (c) Belen, (d) Kirkagac, (e) Merkez, (f) Saruhanli, (g) Soma, (h) Salihli;

** New record for Turkish fauna.

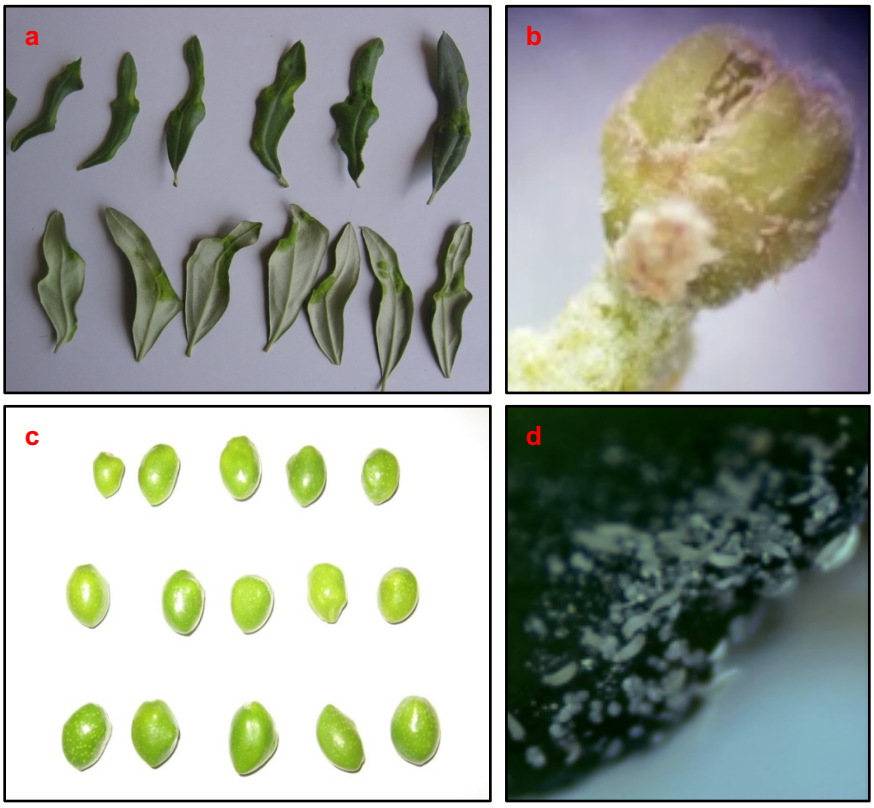

Figure 2. Damage caused by eriophyid mites to leaves, buds and fruit: a) greenish-yellow spots and malformation of leaves, b) rust spots on a bud, c) malformation of fruit, and d) eriophyid mites on a fruit.

Population density of phytophagous mites

The population density of eriophyid mites, *A. oleae* and *T. hassani* in four olive orchards in Izmir (Bornova and Kemalpasa) and Manisa (Akhisar and Saruhanli) in 2016 and 2017 are given in Figures 3 and 4. In Bornova, eriophyid mites first appeared on 23 March 2016 on buds of olive trees with a density of 1.5 mites/bud (Figure 3a). The population density of eriophyids was the highest in late April 2016 (33.3 mites/bud). Subsequently, eriophyids appeared to spread to colonize leaves and fruit in early May 2016. The population of eriophyid mites peaked four times on leaves in mid-May (13.5 mites/leaf), early June (21.9 mites/leaf), late July (15.5 mites/leaf) and late September (3.9 mites/leaf) and peaked three times on fruit in late May (70 mites/fruit), early June (37.5 mites/fruit) and late September (10.4 mites/fruit). In 2017, the first occurrence of the eriophyids on bud was found in early April and the highest density was in mid-April (33.3 mites/bud). The population of eriophyid mites peaked three times on leaves in early May (4.6 mites/leaf), early June (5 mites/leaf) and late July (10 mites/leaf). The highest density on fruit was in early June (60 mites/fruit). Their population on fruit was higher than buds and leaves in both 2016 and 2017 (Figure 3a).

In Kemalpasa, eriophyid mites appeared between late March and early October in 2016 and between early May and early September in 2017 (Figure 3b). Eriophyid mites appeared the first time on buds in late March 2016 and the highest population was in late April (10 mites/bud). The maximum density on leaves and fruit was in mid-June with a density of 23.9 mites/leaf and 78.9 mites/fruit, respectively. In 2017, eriophyids were first observed on buds in late April and their density on buds and leaves peaked in late May (12 mites/bud and 89.5 mites/leaf). Eriophyid mites moved from leaves to fruit at the beginning of June. Their population peaked once in mid-June with a density of 115.5 mites/fruit (Figure 3b).

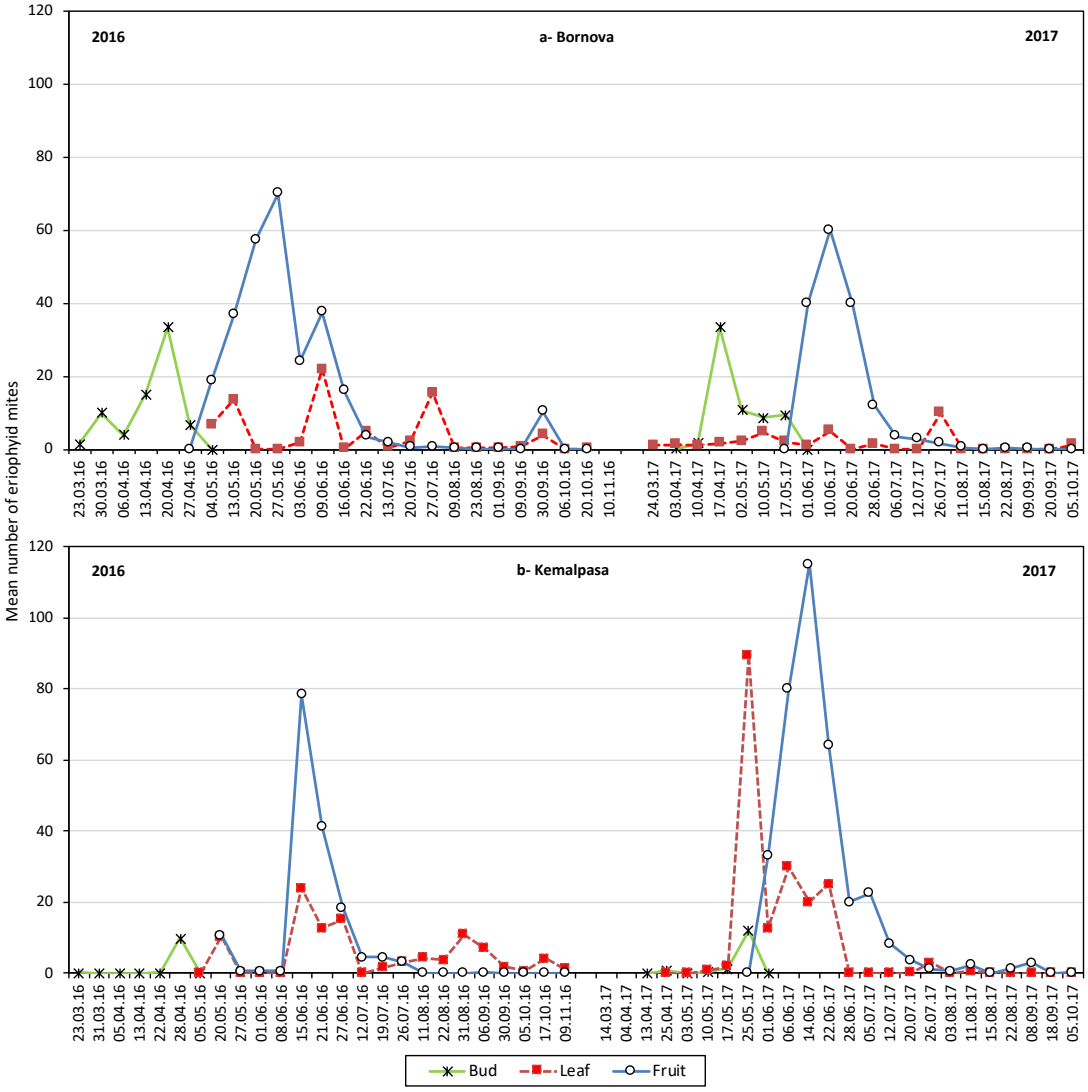

Figure 3. Population densities of eriophyid mites on olive orchards in Bornova (a) and Kemalpasa (b) districts of Izmir, Turkey during 2016-2017.

In Akhisar, eriophyid mites appeared on buds in early April 2016 and their population peaked in early June (44.4 mites/ bud) (Figure 4a). They migrate from buds to leaves in early May. The population of eriophyid mites peaked four times on leaves in early May (3 mites/leaf), mid-June (7 mites/leaf), late July (17.2 mites/leaf) and late August (23.9 mites/leaf) and peaked four times on fruit in mid-June (55.9 mites/fruit), late June (31.7 mites/fruit), late September (4.4 mites/fruit) and early October (5 mites/fruit). In 2017, eriophyid mites observed first on bud and the highest population on buds and leaves was in late May with a density of 2.8 mites/bud and 20 mites/leaf. At the beginning of June, they completely disappeared from the leaves. Then, they were observed on fruit and they peaked in late June (23.2 mites/fruit). The population of eriophyids on both leaves and fruit in 2016 was higher than in 2017 (Figure 4a).

In Saruhanli, eriophyids were first detected in mid-April 2016 on buds and their population peaked two times in late April (4.7 mites/bud) and late May (4 mites/bud). Their population on the leaves was the highest in late May (50 mites/leaf). At the beginning of June, the population was the highest on fruit with a density of 25.7 mites/fruit. In 2017, eriophyid mites appeared first on buds in mid-April and their population peaked in mid-May (2.4 mites/bud). The population of eriophyid mites peaked three times on leaves in late May (25 mites/leaf), mid-June (5 mites/leaf) and late June (8.2 mites/leaf) and peaked once on fruit in late June (51.5 mites/fruit) (Figure 4b).

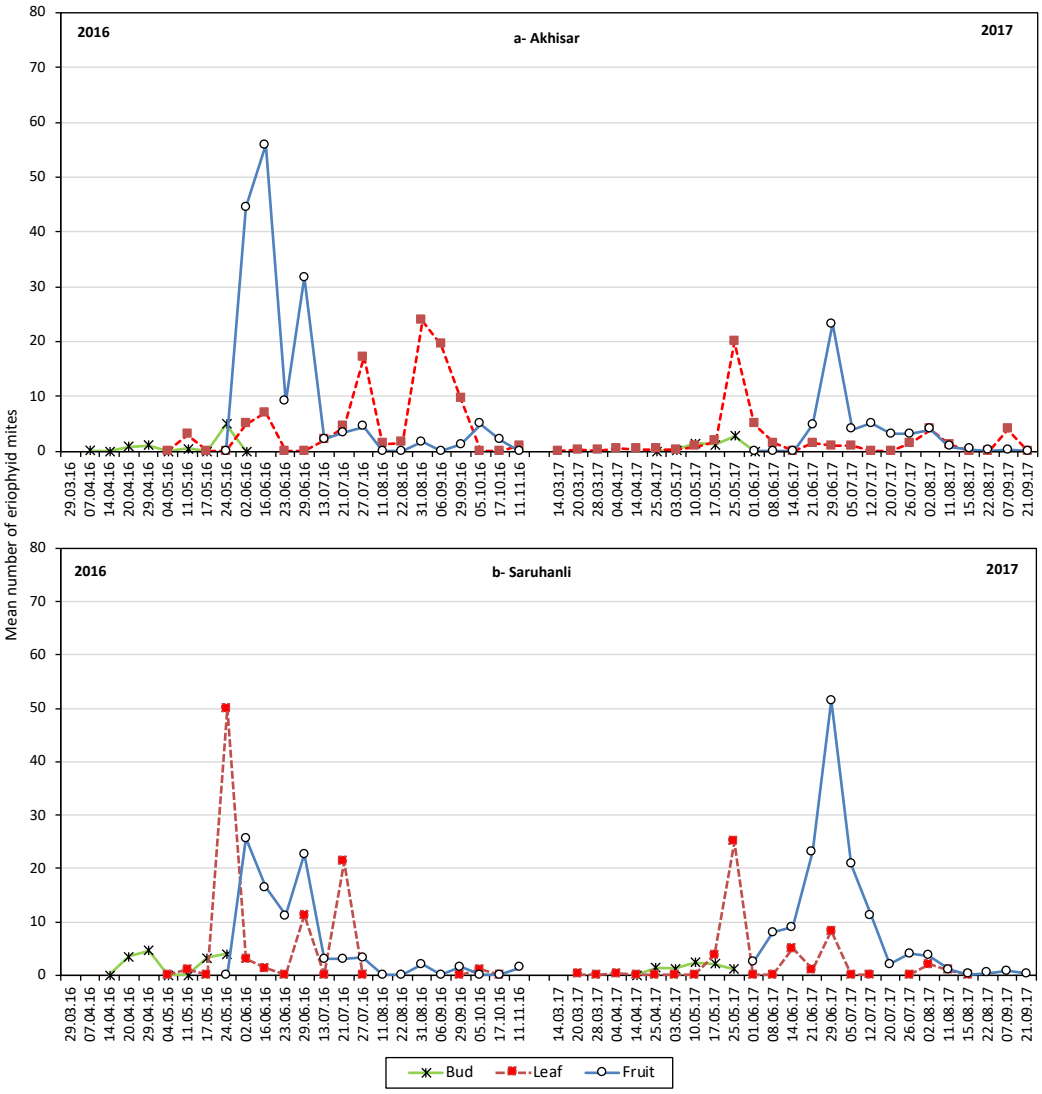

Figure 4. Population densities of eriophyid mites on olive orchards in Akhisar (a) and Saruhanli (b) districts of Manisa, Turkey during 2016-2017.

Discussion

This study showed that eriophyid mites, *A. oleae* and *T. hassani* can be found at all sampled locations in Balikesir, Manisa and Izmir Provinces. Both mite species were found in mixed populations and caused deformation of leaves, buds and fruit. Similarly, in the studies conducted by other researchers, *A. oleae* was reported to be an important pest that feeds on the vegetative parts and fruit of olive trees (Cetin & Alaoglu, 2006; Kacar et al., 2010; Chatti et al., 2017). Kacar et al. (2010) observed that there were dense spots on the upper surface of the leaf which had a greenish-yellow color and slightly collapsed inwards when *A. oleae* fed on the leaves of olive. Also, it has been observed that buds and flowers developed blackening, deformation and drying of the buds (Lindquist et al., 1996; Elhadi & Birger, 1999; Cetin & Alaoglu, 2006; Chatti et al., 2017). During the fruit development period, fruit deformation, rust-like appearance and fruit drop occur in the early period as a result of feeding on fruit stem pits and fruit (Kacar et al., 2010). Similarly, it was found that *T. hassani* caused deformation of olive leaves and fruit and caused color change in rust appearance especially in fruit (Zaher & Hanna, 1965; Jeppson et al., 1975; Abou-Awad et al., 2005; Shahini et al., 2009; Kacar et al., 2010). In the present study, the tenuipalpid mites, *C. lineola*

and *Brevipalpus* sp., were detected from one location in Izmir and nine locations from Balikesir, Manisa and Izmir Provinces, respectively. No damage to olive trees caused by these tenuipalpid mites was observed. These species are generally pests in fruit trees and ornamental plants and are reported to be important plant virus vectors (Miranda et al., 2007).

In this study, Phytoseiidae species were the most common predatory mites. *Typhlodromus athenas* was commonly observed throughout the year in the majority of the olive orchards, and this species is a first record for the Turkish fauna. The primary food sources of *Neoseiulus* and *Typhlodromus* species obtained in this study are tetranychid mites, and they can also feed on phytophagous mites such as eriophyid and tarsonemid mites (Lindquist, 1983; McMurtry et al., 1984). As no tetranychid mites were found in the olive orchards, the phytoseiids most likely feed on eriophyid mites. To confirm this, more detailed studies are needed. Stigmaeidae is the second-largest family of predatory mites after Phytoseiidae (Santos & Laing, 1985; Thistlewood et al., 1996). These mites feed on scale insects, whiteflies and some phytophagous mites of the families Tetranychidae, Tenuipalpidae and Eriophyidae (Santos & Laing, 1985).

In this study it was observed that *Agistemus duzgunesae* feed on eriophyid mites. Similarly, many researchers showed that *Agistemus* species fed on different eriophyid species and completed their development. For example, Momen (2012) found that *Agistemus olivi* Romeih successfully developed and reproduced on all eriophyid mites tested; *Aceria mangiferae* Sayed, 1946, *Aculops lycopersici* (Massee, 1937) and *Aculus fockeui* (Nalepa et Trouessart, 1891). Leiva et al. (2013) reported that *Agistemus aimogastaensis* Leiva, Fernandez, Theron & Rollard, 2013 is an important predator of two eriophyid mites, *A. oleae* and *Oxycenus maxwelli* (Keifer, 1939), in olive orchards in Argentina. That study showed that *A. oleae* and *T. hassani* were found throughout the growing period from April to November in all orchards and their highest population densities were found on buds in April and leaves and fruit in May and June. Similarly, Cetin & Alaoglu (2006), and Leiva et al. (2013) reported that eriophyid mites actively damaged olives from early April to November. In the present study, there were differences in the population densities of eriophyid mites in some olive orchards in 2016 and 2017 (Figures 3 and 4). For instance, the population density of eriophyid mites on fruit was similar in Bornova in both 2016 and 2017, it was higher in Kemalpasa and Saruhanli in 2017 than in 2016, and their density in Akhisar was higher in 2016 than in 2017. Climatic factors, especially temperature and humidity, affect the population density of eriophyid mites (Lindquist et al., 1996). However, there are no huge differences in the average temperature and relative humidity between 2016 and 2017 (Figure 1). Eriophyid mites are locally more abundant on some leaves, buds or fruit. This may be the reason for their high number in some years.

The results of the study showed that the population of eriophyid mites is mostly found on fruit in May and June. For this reason, the control of eriophyid mites for March and April would be recommended as this is when they move from the buds to the leaves. In this way, the populations of eriophyid mites will be reduced before they migrate to the fruit. The prey range of predatory mites, *T. athenas* and *A. duzgunesae,* and their potential as biological control agents of eriophyid mites deserves further studied.

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