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Mite species of kiwi vines in Türkiye

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Original research

ABSTRACT

Kiwifruit, *Actinidia deliciosa* (A. Chev.) C. F. Liang & A. R. Ferguson, is a deciduous vine or shrub in the family Actiniaceae grown for its edible fruit. Türkiye is one of the countries that started kiwi cultivation late. However, with the increase in newly established and productive gardens, it is among the most important countries in the world for kiwi production. The study was carried out to determine leaf-inhabiting mite species in kiwi vines in Türkiye from 2018 to 2022. Surveys were conducted in seven sampling areas in the Ordu, Black Sea Region, Türkiye where the kiwi is cultivated. Leaf samples were collected at 10–15-day intervals from June to November each sampling year. The number of sampled plants per site was determined according to the total number of plants in each kiwi vine. Approximately, 20 leaves from each plant were collected on each sampling date. A total of 24 mite species belonging to 2 orders, 8 families and 15 genera including Phytoseiidae (10 species), Tydeidae (5), Tenuipalpidae (3), Tarsonemidae (2), Cheyletidae (1), Iolinidae (1), Stigmaeidae (1) and Tetranychidae (1) were identified during the study. The results revealed that Ordu's kiwifruit vines are highly abundant in beneficial mite species. The limited use of pesticides in the area may account for this.

Keywords *Actinidia* spp; fauna; mite; pest; predatory

Introduction

Kiwi is the common name for fruits acquired from the hybridization of *Actinidia deliciosa* (A. Chev.) C. F. Liang & A. R. Ferguson (Actiniaceae) and other *Actinidia* species (Gökdoğan 2022). The kiwi was originally cultivated in China, and due to its delicious taste, various health benefits, and versatile usage, it has gained popularity worldwide. As a result, many countries have started producing and exporting kiwis, with China, Italy, and New Zealand leading the way in production. Türkiye is ranked 7th (FAO 2022) among the top countries in kiwi production. A total of 89.000 tons of kiwi are produced annually on 23.941,709 hectares in Türkiye (TUIK 2023).

Kiwi cultivation in Türkiye started later than in other countries. In the 1990s, the Atatürk Central Horticultural Research Institute in Yalova initiated kiwifruit cultivation (Atak 2015). Over time, the profitability of kiwifruit in Türkiye has led to an increase in production and cultivation every year (Atak 2018).

Kiwifruit production in Türkiye is spread across different regions, with 56% of the production areas located in the Black Sea Region. The Marmara Region follows with 41% while the Mediterranean and Aegean Regions have a combined share of 3% (Alp 2017). Ordu province (Black Sea Region, Türkiye) is the seventh-largest producer of kiwifruit in Türkiye, with a production of 5,469 tons (TUIK 2023).

Kiwi is a highly beneficial fruit for human health due to its high content of vitamin C, proteins, and mineral salts. Its juice has been found to prevent cancer. Moreover, kiwi can be used to treat asthma and coughs, as it helps to improve breathing. Additionally, consuming

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kiwi can increase resistance to winter illnesses (Gökdoğan 2022). Additionally, the growth in kiwi exports has also contributed significantly to the national economy, reaching almost 800 million Turkish Liras in 2022 (TRG 2021).

Despite its countless benefits and popularity, few studies have been conducted on mite species found in kiwifruit vines. Lay-Yee and Whiting (1996), Chandurkar (2003), CKC and CMCC Report (2003), Maughan and Black (2015), and Satyagopal *et al.* (2015) stated that *Tetranychus urticae* Koch (Trombidiformes: Tetranychidae) is an important pest mite species on Kiwifruit. According to Steven *et al.* (1997), *Brevipalpus chilensis* Baker (Trombidiformes: Tenuipalpidae) is the most prevalent mite species on Kiwifruit in Chile. The researchers also identified three species of spider mites, two species of tydeid mites, and unidentified phytoseiid, stigmatid, bdellid, raphignathid, Oribatei and Czenspinskiinae mites on the plant. Childers *et al.* (2013) found a *Brevipalpus* sp. on kiwi leaves at the Kearney Research and Extension Center in Parlier, California. Han *et al.* (2020) identified a new mite species, *Leipothrix argutae* Han, Wang & Ai (Trombidiformes: Eriophyidae) in China (Jilin province) on the hardy kiwi, *Actinidia arguta* (Siebold & Zucc.) Planch. ex Miq. (Actinidiaceae). Tshikhudo *et al.* (2021) investigated South Africa's import of kiwifruit (*Actinidia* spp.) as a pathway for the introduction of mites in the genus *Brevipalpus* from 2009 to 2019. They noted the presence of *B. chilensis*, *Brevipalpus* cf. *hondurani* Evans, *Brevipalpus obovatus* Donnadieu, *Brevipalpus lewisi* McGregor (Trombidiformes: Tenuipalpidae) and an undescribed *Brevipalpus* species (*Brevipalpus* sp. nov.). Recently, Saccaggi and Ueckermann (2024) reported that the unknown *Brevipalpus* sp. on imported kiwis is *B. gramani* Baker. In Türkiye, just Gençer Gökçe *et al.* (2022) found a predatory mite, *Phytoseius finitimus* Ribaga (Parasitiformes: Phytoseiidae) on *Actinidia chinensis* Planch. (Actinidiaceae) in Tekirdağ. To our knowledge, a detailed survey of the mite fauna associated with kiwi vines has not been conducted in Türkiye or anywhere else in the world, despite the expanding kiwifruit industry worldwide. So, the overall goal of this work was to determine leaf-inhabiting mite species in kiwi vines in Türkiye.

Material and methods

Sampling areas

The surveys were conducted in kiwi vines in seven different areas in Ordu, Black Sea Region, Türkiye where kiwis are cultivated: Altınordu, Fatsa, Gülyalı, İkizce, Kabadüz, Perşembe, and Ünye (Figure 1). The sampling site's geographical coordinates were recorded using a GPS device (Garmin Etrex 30).

Survey studies

Samplings were carried out from June to November in 2018 and 2019. Leaf samples were collected at an interval of 15-20 days. Leaves were sampled from the lower, middle, and upper parts of the plant canopy on each sampling date. The samples were placed in labeled paper bags, then enclosed in plastic bags and transferred to the laboratory.

The number of plants sampled per kiwi vine was determined based on the total number of plants in each sampling kiwi vine (Table 1). Approximately 20 leaves were collected from each plant.

Identification of mite specimens

Mites were collected from upper and lower leaf surfaces under a stereomicroscope (Leica S8 APO, Heerbrugg, Switzerland) using a fine sable brush (N: 5/0). Specimens were kept in Eppendorf tubes filled with 70% ethanol for preservation purposes. All mites were cleared in lactophenol solution, mounted in Hoyer's medium, and dried at 50 °C for 7-10 days (Krantz and Walter 2009). The mites were identified at the species level using appropriate identification

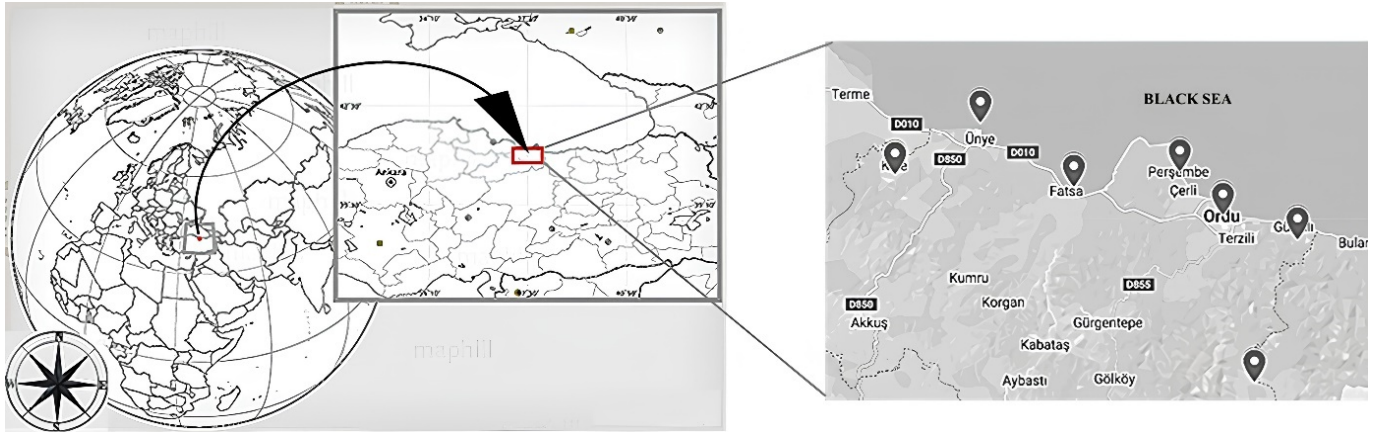


Figure 1 Sampling areas that have been cultivated kiwifruit in Ordu, Black Sea Region, Türkiye.

keys such as Zhang (2000) for the family Tarsonemidae, Çobanoğlu *et al.* (2016) and Mesa *et al.* (2019) for the family Tenuipalpidae, Migeon and Dorkeld (2024) for the family Tetranychidae, Volgin (1987) and Yeşilayer and Çobanoğlu (2012) for the family Cheyletidae, Tseng (1982) and Gonzalez-Rodriguez (1965) for the family Stigmaeidae, Ueckermann *et al.* (2019) for the family Iolinidae, Ueckermann *et al.* (2019) and Da Silva *et al.* (2016) for the family Tydeidae, Döker *et al.* (2016), Akyazı *et al.* (2016b), Bas *et al.* (2022) and Denmark and Evans (2019) for the family Phytoseiidae. The mite species were identified using a light microscope equipped with a phase-contrast feature (Leica DM 2500, Heerbrugg, Switzerland). Confirmation of species identification and some identifications were made by the third author at North-West University, South Africa.

Results and discussion

In the study conducted in Kiwi vines located in Tukey's Black Sea region (Ordu), 24 species of mites were identified from 2 orders, 8 families, and 15 genera during the years 2018-2019 as listed in Table 2. The number of species of the eight families: Phytoseiidae 10, Tydeidae 5, Tenuipalpidae 3, Tarsonemidae 2, Cheyletidae 1, Iolinidae 1, Stigmaeidae 1 and, Tetranychidae 1.

A comprehensive survey on mite species in kiwi vines worldwide has not been conducted. Additionally, there is no available information on the damage symptoms caused by pest mite species on kiwi plants. Therefore, the study discusses the injury symptoms of detected pest mite species on various host plants. Additionally, only *B. lewisi* and *B. obovatus* in all determined species have been identified on imported kiwi fruit in previous studies. None of the other species have been previously detected in kiwi vines, so other hosts/habitats of determined species were discussed.

Table 1 The number of sampled kiwi plants according to the total number of plants in each sampling kiwi vine (Madanlar 1991).

Total plant number within each sampling area	Sampled plant number
0-50	All plants
51-200	50 plants
2001-400	60 plants
More than 400	20% of the total number of plants

Order Trombidiformes

Superfamily Tarsonemoidea

Family Tarsonemidae Canestrini & Fanzago 1877

***Polyphagotarsonemus latus* (Banks 1904)**

Material examined — 1 ♀ (Ünye, N41°5'3.21" E37°11'12.07", 241 m, 18.VII.2018)

Remarks — Banks (1904) first described this species as *Tarsonemus latus* from mango buds in Washington D.C., USA (Denmark 1980). This phytophagous mite is distributed worldwide (Fasulo 2004). It has been reported in various regions including Australia, Asia, Africa, Europe, North and South America, and the Pacific Islands. The species is commonly found in tropical and subtropical regions but can also occur in temperate areas. It is a globally significant agricultural pest with the ability to feed on plants from over 60 botanical families including Solanaceae, Cucurbitaceae, and Malvaceae (Grinberg *et al.* 2005; Ovando-Garay 2022). In Türkiye, it was first recorded from citrus and *Morus alba* L. (Moraceae) leaves in Antalya by Çobanoğlu (1995). It was also collected from vineyards, mulberry, cotton, rubber, peach (Uygun *et al.* 1995), vegetables (Uygun *et al.* 1995; Bulut and Göçmen 2000; Can and Çobanoğlu 2010; Soysal and Akyazı 2018), tea plantations (Özman Sullivan *et al.* 2006, 2007; Diler *et al.* 2022) and persimmon (Akyazı *et al.* 2016a, 2017). This pest targets the young parts of plants and can inject toxic saliva into their tissues. Although there is no record of its damage symptoms on kiwi, feeding by this pest causes twisted, hardened, and distorted growth in the terminal tips of a plant. Damaged leaves turn coppery in color and curl. Heavily infested plants will drop their leaves, fail to flower, and produce bronze, cracked, or blemished fruits. Since these mites are microscopic, they can only be detected when the

Table 2 Mite species in Kiwifruit vines in Türkiye (Ordu, Black Sea Region).

Superorder	Order	Family	Species	♀	♂	N	Total
Acariformes	Trombidiformes	Tarsonemidae	<i>Polyphagotarsonemus latus</i>	1	-	-	1
			<i>Tarsonemus confusus</i>	1	-	-	1
		Tenuipalpidae	<i>Brevipalpus californicus</i>	-	2	-	2
			<i>Brevipalpus lewisi</i>	6	-	-	6
			<i>Brevipalpus obovatus</i>	8	-	-	8
		Tetranychidae	<i>Eotetranychus rubiphilus</i>	3	3	-	6
		Cheyletidae	<i>Cheletomimus berlesei</i>	2	-	1	3
		Stigmaeidae	<i>Zetzellia mali</i>	5	1	-	6
		Iolinidae	<i>Pronematus ubiquitous</i>	1	-	-	1
		Tydeidae	<i>Brachytydeus obnoxia</i>	4	-	-	4
			<i>Brachytydeus paraobliquus</i>	1	-	-	1
			<i>Tydeus calabrus</i>	2	1	-	3
			<i>Tydeus kochi</i>	4	2	-	6
<i>Tydeus spathulatus</i>	4		-	-	4		
Parasitiformes	Mesostigmata		Phytoseiidae	<i>Amblyseius andersoni</i>	4	-	-
		<i>Amblyseius bryophilus</i>		1	-	-	1
		<i>Amblyseius herbicolus</i>		6	-	-	6
		<i>Proprioseiopsis okanagensis</i>		1	-	-	1
		<i>Euseius finlandicus</i>		1	-	-	1
		<i>Euseius amissibilis</i>		4	-	-	4
		<i>Euseius stipulatus</i>		5	-	-	5
		<i>Neoseiulus umbraticus</i>		2	-	-	2
		<i>Typhlodromips sessor</i>		2	-	-	2
		<i>Phytoseius finitimus</i>		9	-	-	9
Total				77	9	1	87

symptoms become visible (Akyazı *et al.* 2022a). Due to its high reproductive potential, it can quickly reach damaging densities (CABI 2021). Before 1992, no specific natural enemies of *P. latus* were known. Gerson (1992) first summarized the control of *P. latus* by predatory mites belonging to *Amblyseius*, *Euseius*, and *Typhlodromus* species on various crops worldwide. Among the phytoseiid mites found in this study, *Amblyseius herbicolus* (Chant) (Mesostigmata: Phytoseiidae) was found as associated with *P. latus* (Luybaert 2015).

***Tarsonemus confusus* Ewing 1939**

Material examined — 1 ♀ (Altınordu, N40°56'48.96" E37°59'45.86", 20 m, 02.IX.2019)

Remarks — *Tarsonemus confusus* was first reported on *Delphinium belladonna* (Ranunculaceae) by Ewing (1939). It is a cosmopolitan species and has been recorded on various continents including North America (USA; Canada), South America (Brazil), Europe (Türkiye, Portugal, Italy, Ireland, Germany, Poland, Belarus, Ukraine, Russia), East Asia (Japan, Korea, China), and Africa (Egypt) (Zhang 2003; Santos 2011; Andrade-Bertolo *et al.* 2013; Akyazı *et al.* 2021). This species has been found worldwide on many plants, in soil, filters, house dust, and bird's nests (Zhang 2003; Demite *et al.* 2022). In Türkiye, this mite was first identified on *Pyracantha coccinea* Roem (Rosaceae) in Edirne (Çobanoğlu 1995). Later, it was collected from many other plants, such as *Cucumis sativus* L. (Cucurbitaceae), *Solanum esculentum* L., *Capsicum annuum* L., *Solanum nigrum* L. (Solanaceae), *Convolvulus arvensis* L. (Convolvulaceae) *Stellaria media* L. (Caryophyllaceae), *Amaranthus retroflexus* L. (Amaranthaceae), *Chenopodium album* L. (Amaranthaceae) (Tokkamuş 2011), *S. esculentum* (Çobanoğlu and Kumral 2014), *Solanum melongena* L. (Solanaceae) (Kumral and Çobanoğlu 2015), persimmon (Akyazı *et al.* 2017), vegetables (Soysal and Akyazı 2018), and pome fruits (Akyol and Akyazı 2022). This species has been found in both thelytokous and sexual populations (Lindquist 1986; Wrensch and Ebbert 1993; Hernandez and Feres 2006). *Tarsonemus confusus* was declared primarily a fungivorous mite (Garga *et al.* 1997; Zhang 2003). In addition, it is considered a minor pest for some ornamentals in greenhouses in Europe and tomatoes in North America (Zhang 2003). However, Zhang (2003) noted that *T. confusus* can cause significant damage to plants when its population is high. Recently, it has become an economically important pest in orchards in China (Li *et al.* 2022). Although no reports regarding its damage to kiwi fruit have been identified, Wang *et al.* (1999) suggested that it is a major contributor to black dot symptoms on apple and peach fruit. Further evidence by Hao *et al.* (2007, 2010) also indicates that symptoms on bagged apples may be attributed to *T. confusus* (Li *et al.* 2022). It was also found strongly associated with core rot diseases in apple orchards (Michailides *et al.* 1994; Van der Walt *et al.* 2011; Li *et al.* 2022). Li *et al.* (2018) demonstrated that *Neoseiulus barkeri* Hughes (Mesostigmata: Phytoseiidae) has the potential to be a highly effective biological control agent for *T. confusus*. There is no record of its relationship with the predatory mite detected in the current study.

Superfamily Tetranychoidae Donnadieu 1876

Family Tenuipalpidae Berlese 1913

***Brevipalpus californicus* (Banks 1904)**

(Probably group of species *Brevipalpus californicus*, Beard *et al.* 2015)

Material examined — 2 ♂♂: 1 ♂ (Altınordu, N40°57'1.99" E38°0'15.43", 13 m, 02.IX.2019), 1 ♂ (İkizce, N41°2'58.80" E37°4'23.71", 147 m, 31.VII.2019)

Remarks — Beard *et al.* (2015) identified 4 morpho-type groups in this species that are still due for further examination. According to confirmed specimens, this species was detected in Australia, Ecuador, Italy, Mexico, Nepal, Palestine, South Africa, Spain, Sri Lanka, The Philippines, USA (MD). It was collected from *Abies* sp. (Pinaceae), *Begonia* sp. (Bignoniaceae); *Chirimoya* sp. (Annonaceae); *Choisya ternate* Kunth, *Citrus* sp. *Citrus aurantifolium* (Christm.), *Citrus nobilis* Lour. (Rutaceae), coconut *Cocos nucifera* L. (Areaceae); *Gardenia* sp.

(Rubiaceae); lemon (Rutaceae); orchids (Orchidaceae) and tea *Camelia sinensis* L. (Theaceae) in these countries (Beard *et al.* 2015). In Türkiye, it was collected from *Philadelphus coronarius* L. (Hydrangeaceae) in Erzurum by Çobanoğlu *et al.* (2020). *Brevipalpus* species can damage plants by causing symptoms such as chlorosis, blistering, bronzing, or necrotic areas at high population densities. Their most significant impact is the ability to transmit plant viruses (Tshikhudo *et al.* 2021). Although there is no record of *B. californicus*'s damage to kiwi, it is an economically important *Brevipalpus* species that feed on twigs, petioles, leaf surfaces, and developing buds of seedlings. Its feeding causes silvering of affected tissue and brown speckling of orange rinds. Due to feeding, *Grevilla robusta* Cunningham's leaves become chlorotic, turn brown and drop prematurely (Childers *et al.* 2003). *Phytoseiulus persimilis* Athias-Henriot, *Amblyseius largoensis* (Muma), *Euseius scutalis* (Athias-Henriot), *Neoseiulus cucumeris* (Oudemans), *Proprioseiopsis* sp. (Mesostigmata: Phytoseiidae) and *Cheletomimus* sp. (Trombidiformes: Cheyletidae) were given among natural enemies associated with *B. californicus* by Cortez- Mondaca *et al.* (2022). Among them, *Proprioseiopsis okanagensis* (Chant) (Mesostigmata: Phytoseiidae) was found in kiwifruit orchards in the current study.

***Brevipalpus lewisi* McGregor 1949**

Material examined — 6 ♀♀: 3 ♀♀ (Altınordu, N40°56'31.25" E37°58'59.40", 58 m, 02.IX.2019), 3 ♀♀ (Gülyalı, N40°58'16.97" E37°59'52.57", 7 m, 02.IX.2019)

Remarks — *Brevipalpus lewisi*, a phytophagous mite, was recorded in Australia, China, Egypt, Georgia, Greece, Hungary, India, Iran, Israel, Italy, Japon, Mexico, Portugal, Saudi Arabia, South Africa, South Korea, Spain, Taiwan, Tunisia, Türkiye, Ukraine and USA (Alaska, Arizona, California). It was found on various plants, mainly belonging to the families Rutaceae, Vitaceae, Rosaceae, and Oleaceae from around the world (Beard *et al.* 2015; Castro *et al.* 2024). In Türkiye, it was collected from Aegean vineyards (Bayram and Çobanoğlu 2007; Göven *et al.* 2009), *S. melongena*, *Phaseolus vulgaris* L. (Fabaceae) and *C. annuum* in Ordu (Soysal and Akyazı 2018) and *Campis radicans* Seem. (Bignoniaceae) in Tekirdağ (Gençer Gökçe *et al.* 2022). This mite is a major problem for oranges, tangerines, and lemons in California, USA, and Japan. The population of this pest reaches its peak during the warmest months. Mites feeding on fruit create scab-like scars that can cover most of the fruit, reducing its quality. The pest caused severe leaf chlorosis in "blue Serbian" vineyards in Israel. It is a pest of citrus, grapes, and pomegranates in Greece. However, it is currently unknown whether it can transmit viruses (Ueckermann *et al.* 2018). *Brevipalpus lewisi* was detected on kiwifruit imported to South Africa from Greece and Italy (Tshikhudo *et al.* 2021). *Homeopronematus anconai* (Baker) (Prostigmata: Iolinidae), *E. scutalis*, *Metaseiulus (Metaseiulus) flumenis* (Chant) (mentioned as *Typhlodromus flumenis* Chant), *Typhlodromus reticulatus* Oudemans (Mesostigmata: Phytoseiidae) were given as natural enemies of *B. californicus*, but none of them were found in the Kiwi vines in the present study (CABI, 2019).

***Brevipalpus obovatus* Donnadieu 1875**

Material examined — 8 ♀♀: 2 ♀♀ (Fatsa, N41°0'23.60" E37°31'20.10", 15 m, 06.VIII.2018), 1 ♀ (Fatsa, N41°0'56.71" E37°31'27.23", 7 m, 06.VIII.2018), 1 ♀ (Fatsa, N40°55'57.68" E37°37'14.16", 372 m, 06.VIII.2018), 1 ♀ (Perşembe, N41°1'12.14" E37°49'28.42", 6 m, 26.VII.2018), 3 ♀♀ (Ünye, N41°4'11.40" E37°13'35.34", 281 m, 18.VII.2018)

Remarks — *Brevipalpus obovatus* was found on a wide range of hosts worldwide (Beard *et al.* 2015; Castro *et al.* 2024). In Türkiye, the species was first discovered on lemon trees in Mersin by Düzgüneş (1952). Later, it was found on various plants such as *Citrus limonium* L. (Rutaceae), *Fragaria* sp. (Rosaceae), *Hedera helix* L. (Araliaceae), ornamental plants, weeds (Düzgüneş 1965, 1977), chestnut (Önuçar and Ulu 1988) *Coleus* sp. (Lamiaceae), *H. helix*, *Mikania* sp. (Asteraceae) and *Spathiphyllum wallisii* Regel (Araceae) (Bozkurt 1994), tea (Özman- Sullivan *et al.* 2007), persimmon (Akyazı *et al.* 2016a, 2017), vegetables (Soysal and Akyazı 2018), and *Cornus mas* L. (Cornaceae) (Altunç and Akyazı 2019) over the years. This

phytophagous mite may cause chlorosis or necrotic areas on citrus leaves. In addition, it is strongly associated with the nuclear citrus leprosis viruses; citrus leprosis virus N (CiLV-N) and citrus necrotic spot virus (CiNSV) in the New World (Ueckerman *et al.* 2018). The species was detected on just kiwifruit imported to South Africa from New Zealand, China, Greece and Italy (Tshikhudo *et al.* 2021). It was found in association with the phytoseiids, *Amblyseius swirskii* Athias & Henriot, *Typhlodromus (Anthoseius) recki* Wainstein, *P. finitimus*, *E. scutalis*, *Euseius stipulatus* (Athias & Henriot) on solanaceous plants in the Syrian coastal region (Dayoub and Boubou 2023). Among them, *P. finitimus* and *E. stipulatus* were detected in Ordu's kiwi vines in the current study.

Family Tetranychidae Donnadieu 1875

Eotetranychus rubiphilus Reck 1948

Material examined — 3 ♀♀, 3 ♂♂: 2 ♀♀ (Kabadüz, N40°49'33.83" E37°52'43.94", 698 m, 14.VI.2018), 1 ♀ 3 ♂♂ (Perşembe, N41°4'29.02" E37°43'52.77", 455 m, 26.VII.2018)

Remarks — *Eotetranychus rubiphilus* was first discovered on *Rubus* sp. (Rosaceae) in Georgia by Reck (1948). So far, this phytophagous mite has been recorded in several Palearctic countries such as Armenia, Azerbaijan, France, Georgia, Italy, Korea, Portugal, the Russian Federation, Serbia, Spain, Syria, Türkiye, and Ukraine. According to Migeon and Dorkeld (2024), it has been found on various host plants worldwide, including those from the families Brassicaceae, Geraniaceae, Rosaceae, and Vitaceae. In Türkiye, it was first reported on *Prunus domestica* L. and *Prunus cerasus* L. (Rosaceae) in Ordu by Altunç and Akyazı (2020). Little is known about the biology of *E. rubiphilus*. It was considered as the most important phytophagous mite affecting blackberries, particularly in greenhouses (Naves *et al.* 2021). Altunç and Akyazı (2020) found this mite along with some predators such as *P. finitimus*, *Euseius finlandicus* (Oudemans), *Typhlodromus (Typhlodromus) tiliae* Oudemans (Mesostigmata; Phytoseiidae), *Cunaxoides lootsi* Den Heyer & Castro (Trombidiformes: Cunaxidae) and *Tydeus californicus* (Banks), *T. goetzi* Schruft (Trombidiformes: Tydeidae) (predator tydeoid mites according to Baker and Wharton 1952; Gerson *et al.* 2003; Walter and Proctor 2013). Among phytoseiid predators, *P. finitimus* and *E. finlandicus* were also found in the kiwi vines of Ordu in the present study.

Superfamily: Cheyletoidea, Leach 1815

Family Cheyletidae, Leach 1815

Cheletomimus (s.str.) berlesei (Oudemans 1904)

Material examined — 2 ♀♀, 1 nymph: 1 ♀, 1 nymph (Altınordu, N40°56'13.73" E38°0'20.40", 345 m, 02.IX.2019), 1 ♀ (Gülyalı, N40°56'26.84" E38°1'12.29", 312 m, 18.IX.2019)

Remarks — *Cheletomimus berlesei* is a predatory mite species that has been reported in different parts of the world including Italy, France, Israel, USA, New Zealand, Russia, Iran, and Türkiye (Summer and Price 1970; Volgin 1987; Jalilrad *et al.* 2013; Salarzahi *et al.* 2018; Doğan 2022). In Türkiye, this species was first reported on *Cedrus atlantica* (Endl.) Manetti ex Carrière (Pinaceae), *Cupressus arizonica* Greene (Cupressaceae), and *Pittosporum tobira* (Thunb.) W.T.Aiton (Pittosporaceae), *C. arizonica*, and *P. tobira* in Istanbul by Yeşilayaer and Çobanoğlu (2012). Later, it was collected from *S. melongena* (Soysal and Akyazı 2018) and *Eriobotrya japonica* (Thunberg) Lindley (Rosaceae) (Akyol and Akyazı 2022) in Ordu. It has been declared as a natural enemy of *Cenopalpus lineola* (Canestrini and Fanzago) (Trombidiformes: Tenuipalpidae) and *Hemiberlesia lataniae* (Signoret) (Hemiptera: Diaspididae) (CABI 2004).

Superfamily Raphignathoidea Kramer 1877**Family Stigmaeidae Oudemans 1931*****Zetzellia mali* (Ewing 1917)**

Material examined — 5 ♀♀ 1 ♂: 4 ♀, 1 ♂ (Altınordu, N40°54'36.26" E37°50'22.97", 140 m, 02.IX.2019), 1 ♀ (Ünye, N41°5'3.21" E37°11'12.07", 241 m, 18.VII.2018)

Remarks — *Zetzellia mali* was originally classified under the genus *Caligonus*. Later, Ewing (1921) transferred the species to the genus *Syncaligus*. However, Oudemans (1929) transferred it to the genus *Zetzellia* (Summers 1960). The species was recorded in Austria, Bulgaria, Canada, China, Czech, France, Germany, Hungary, India, Iran, Italy (including Sardinia), Lebanon, Lithuanian SSR, Moldavia, Netherlands, Poland, Serbia, Slovenia, Spain, Switzerland, Tunisia, Türkiye, UK, USA and Yugoslavia (Fan *et al.* 2016). In Türkiye, this species was first reported as *Mediolata mali* (Ewing) (Trombidiformes: Raphignathidae) on apple leaves in Bilecik by Düzgüneş (1963). It has since been recorded from various plants including hazelnut (Samsun), *Juglans regia* L. (Juglandaceae) (Ankara, Van), ornamental trees and shrubs (Ankara, Istanbul), fruit trees (Van, Bursa, Tokat, Diyarbakır), *S. esculentum* and *S. melongena* (Bursa, Ankara) (Akyazı and Ecevit 2003; Çobanoğlu *et al.* 2003; Kumral 2005; Doğan 2007; Kasap *et al.* 2007; Kasap and Çobanoğlu 2007; Denizhan and Çobanoğlu 2008, 2009; Sağlam and Çobanoğlu 2010; Yeşilayer and Çobanoğlu 2013; Çobanoğlu and Kumral 2014; Kumral and Çobanoğlu 2015; Miroğlu and Çıkman 2022). In previous studies in Ordu, which is the field of this study, it was collected from various plants such as *Diospyros kaki* Thunb. (Ebenaceae) (Akyazı *et al.* 2016a, 2017), *P. vulgaris*, *S. melongena*, *Solanum lycopersicum* L. (Solanaceae), *Cucurbita* sp. (Cucurbitaceae) (Soysal and Akyazı 2018), *Malus domestica* Borkhausen, *Pyrus communis* L., *Cydonia oblonga* Miller (Rosaceae), *E. japonica* (Akyol and Akyazı 2022), and *Prunus laurocerasus* L. (Rosaceae) (Akyazı *et al.* 2022b). Croft (1994) stated that *Z. mali* feeds on eggs and immature stages of the European red mite, as well as the active stages of the apple rust mite. Khanjani and Ueckermann (2002) also reported that it prefers to feed on eriophyid mites rather than adult tetranychid mites. Santos (1976) and Clements and Harmsen (1993) found that it has a high reproduction rate on *Panonychus ulmi* (Koch) (Trombidiformes: Tetranychidae). Denizhan and Çobanoğlu (2009) collected it from eriophyid galls. Kasap and Çobanoğlu (2007) also found it in apple orchards, along with *Bryobia rubrioculus* Scheuten, *Amphitetranynchus viennensis* (Zacher) (Trombidiformes: Tetranychidae), *P. ulmi*, tydeid and phytoseiid species. Additionally, Dönel and Doğan (2013) have even collected it from bird nests. Moreover, it is known that *Z. mali* can feed on the eggs of other predator mites, as mentioned by Kain and Nyrop (1995). Akyol and Akyazı (2022) found that *Z. mali* and *Transeius wainsteini* (Gomelaurei) (Mesostigmata: Phytoseiidae) had the highest tendency to occur together in a predatory species complex. The pair *E. finlandicus-Typhlodromus (Anthoseius) rapidus* Wainstein & Arutunjan (Mesostigmata: Phytoseiidae), and *T. rapidus-Z. mali* also showed a highly positive association.

Superfamily: Tydeoidea Kramer 1877**Family: Iolinidae Pritchard 1956*****Pronematus ubiquitous* (McGregor 1932)**

Material examined — 1 ♀ (Ünye, N41°4'11.40" E37°13'35.34", 281 m, 18.VII.2018)

Remarks — *Pronematus ubiquitous* was originally reported as *Tydeus ubiquitous* in Lindsay, California from foliage of citrus trees (McGregor 1932). This species is distributed across all continents except for Antarctica. It was found in North America (Acuna-Soto *et al.* 2017), South America (Sousa *et al.* 2015), Europe (Vela *et al.* 2017), Africa (Ueckermann and Grout 2007), Asia (Baradaran and Arabi 2009), and Oceania (Maynard *et al.* 2018). The following locations in Türkiye have reported the presence of this species on various plants: tomato in İzmir (Yaşarakıncı and Hıncal 1997); vineyards in İzmir, Manisa, and Denizli (Göven

et al. 2009); eggplant, melon, and zucchini in Antalya (Can and Çobanoğlu 2010); tomato in Ankara (Çobanoğlu and Kumral 2014) and Bursa (Çobanoğlu and Kumral 2014; Aysan and Kumral 2018), *Solanum dulcamara* L. (Solanaceae) in Ankara, *S. nigrum* in Ankara and Bursa (Kumral and Çobanoğlu 2015); pear (Akyol and Akyazı 2022); and *P. laurocerasus* (Akyazı *et al.* 2022b) in Ordu. This mite is a predator species that feeds on small prey such as eriophyid and tetranychid mites, as well as plant-based food sources like plant sap, pollen, and fungi (Pijnakker *et al.* 2022a, b). In addition, it was noted that *P. ubiquitus* is an effective solution to combat two main problems in tomato crops: *Aculops lycopersici* (Masse) (Tormbidiformes: Eriophyidae) and powdery mildew (*Oidium neolyopersici* L. Kiss). It is possible to pre-establish and build up large populations of this mite by supplementing tomato plants with pollen (Duarte *et al.* 2021; Pijnakker *et al.* 2022b; Moerkens *et al.* 2023). Because of its importance as potential bio-control agent of *Aculops lycopersici* but with morphological variability between specimens of different origins and type material, which is in a bad state, Ueckermann *et al.* (2024) undertook a thorough revision of this species based on material from the type locality compared with populations of other regions.

Family: Tydeidae Kramer 1877

Brachytydeus obnoxius Kuznetsov et Zapletina 1972

Brachytydeus obnoxia, incorrect subsequent spelling (gender) used by Da Silva *et al.* (2016: 20)

Brachytydeus obnoxius subsequent combination used by Da Silva *et al.* (2016: 20) corrected under art. 34.2 of ICZN

Material examined — 4 ♀♀: 1 ♀ (Altınordu, N40°56'33.03" E37°56'20.31", 11 m, 02.IX.2019), 2 ♀♀ (Fatsa, N40°58'39.92" E37°36'41.00", 178 m, 06.VIII.2018), 1 ♀ (İkizce, N41°2'1.16" E36°59'18.41", 605 m, 31.VII.2019), 1 ♀ (İkizce, N41°5'8.42" E37°1'38.94", 484 m, 31.VII.2019)

Remarks — *Brachytydeus obnoxius* was first reported on nuts from Azerbaijan (Livshitz *et al.* 1972). It was later recorded from a birch tree stand in Poland (Laniecki *et al.* 2021) and grassy plant leaves in Russia (Khaustov 2023). In Türkiye, this species was found in a survey of hazelnut orchards throughout the growing areas in the Black Sea Region by Özman-Sullivan *et al.* (2005).

Brachytydeus paraobliquus (Panou & Emmanuel 1996)

Brachytydeus paraobliqua: Incorrect subsequent spelling (gender) used by Tempfli *et al.* (2015:946) and adopted by Da Silva *et al.* (2016: 21)

Brachytydeus paraobliquus, subsequent combination used by Tempfli *et al.* (2015: 946) and adopted by Da Silva *et al.* (2016: 21) corrected under art. 34.2 of ICZN.

Material examined — 1 ♀ (Ünye, N41°6'18.31" E37°19'39.58", 9 m, 18.VII.2018)

Remarks — *Brachytydeus paraobliquus* was first described by Panou and Emmanuel in 1996 from *P. cerasus* and *Cornus* sp. in Greece. In Hungary, Ripka *et al.* (2002) were the first to identify this species on *Tilia tomentosa* Moench (Malvaceae) leaves. Later, Tempfli *et al.* (2015) found it in Hungarian vineyards. In Türkiye, Özman-Sullivan *et al.* (2005) first reported it as *Lorryia paraobliqua* in the hazelnut orchards of Samsun. In a recent study in Ordu Province of Türkiye, Akyazı *et al.* (2017) found the species on *D. kaki* and *Diospyros latus* L. (Ebenaceae) leaves and re-described it. They also described the deutonymph and tritonymph for the first time. The species was found on various other plants in Ordu, including *P. domestica*, *Prunus avium* L. (Rosaceae), *P. cerasus*, *C. mas* (Altunç and Akyazı 2019), *M. domestica*, *P. communis*, *Cydonia oblonga* Mill. (Rosaceae) (Akyol and Akyazı 2022) and *P. laurocerasus* (Akyazı *et al.* 2022b).

***Tydeus calabrus* (Castagnoli 1984)**

Material examined — 2 ♀♀ 1 ♂: 1 ♀ (İkizce, N41°5'31.02" E37°3'0.60", 525 m, 31.VII.2019), 1 ♀ (İkizce, N41° 0'38.45" E37°1'36.16", 527 m, 31.VII.2019), 1 ♂ (Ünye, N41°5'3.21" E37°11'12.07", 241 m, 18.VII.2018)

Remarks — *Tydeus calabrus* is a rare species. Castagnoli (1984) first reported the species from olive trees in Italy. Momen and Lundqvist (1996) collected it from the bark of apple trees in Sweden, while Sadeghi *et al.* (2012) found this species on citrus trees in Iran. In Türkiye, it was recorded on *Fagus orientalis* Lipsky (Fagaceae) in Kırklareli and *Citrus* sp. in İzmir by Çobanoğlu and Kazmierski (1999) and on *P. laurocerasus* in Ordu by Akyazı *et al.* (2022b).

***Tydeus kochi* Oudemans 1928**

Material examined — 4 ♀♀ 2 ♂♂: 1 ♀ (Gülyalı, N40°56'54.57" E38° 2'6.78", 380 m, 18.IX.2019), 3 ♀♀ 2 ♂♂ (İkizce, N41°5'8.42" E37°1'38.94", 484 m, 31.VII.2019)

Remarks — *Tydeus kochi* has a worldwide distribution. It was found in all types of climatic zones on moss, lichens and *Vitis* sp. (Tempfli *et al.* 2015; Da Silva *et al.* 2016). In Türkiye, the species was found on pome fruits and weeds in Balıkesir and Çanakkale (Kasap *et al.* 2013), tomato in Ankara and Bursa (Çobanoğlu and Kumral 2014), eggplant in Bursa (Kumral and Çobanoğlu 2015), grape leaf litter in Ankara (İnak and Çobanoğlu 2018), *Syringa vulgaris* L. (Oleaceae) and *Robinia pseudoacacia* L. (Fabaceae) in Erzurum (Çobanoğlu *et al.* 2020). Rasmy (1971) identified this species as an important predatory species for the biological control of Citrus Brown mite, *Eutetranychus orientalis* (Klein) (Trombidiformes: Tetranychidae) in two citrus orchards in Giza and Taheer, Egypt. Aysan and Kumral (2018) found this species to be associated with *A. lycopersici* on tomato in Türkiye (Bursa).

***Tydeus spathulatus* Oudemans 1928 sensu Andre (2005)**

Material examined — 4 ♀♀. 1 ♀ (Gülyalı, N40°58'37.75" E37°59'56.64", 4 m, 02.IX.2019), 1 ♀ (İkizce, N41°2'58.80" E37°4'23.71", 147 m, 31.VII.2019), 1 ♀ (İkizce, N41°2'17.67" E37°3'13.69", 180 m, 31.VII.2019), 1 ♀ (Perşembe, N41°4'29.02" E37°43'52.77", 455 m, 26.VII.2018)

Remarks — It has been observed that some specimens previously identified as *Tydeus californicus* (Banks 1904) sensu Baker and Wharton (1952), or sensu Baker (1970) might be *Tydeus spathulatus* Oudemans (Trombidiformes: Tydeidae) (Oudemans 1928; Baker and Wharton 1952; Baker 1970; Andre 2005). Both *T. californicus* and *T. spathulatus* have spatulate-fusiform and distally tapered posterior opisthosomal setae (*fl*, *f2*, *h1*, *h2*, *ps1*, *ps2*). There are transverse or subtly bent striae between their setae *h1* as well. Moreover, a third species, namely *Tydeus laudatus* Tseng (Trombidiformes: Tydeidae) is potentially a junior synonym of the above-mentioned two species (Tseng 1985). So, the situation regarding the 'californicus' species group is currently unclear and requires further investigation (Ripka *et al.* 2022). It seems that the Turkish specimens in the current study have a close resemblance to the redescription of *T. spathulatus* (Andre 2005) in all aspects. This species was first described in Italy (Andre 2005). It was also reported from Hungary (Tempfli *et al.* 2015) and Russia (Khaustov 2023). In Türkiye, the species was found on *M. domestica* in Balıkesir (Kasap *et al.* 2013), and on *S. dulcamara* in Ankara (Kumral and Çobanoğlu 2015).

Order: Mesostigmata**Family: Phytoseiidae Berlese 1916*****Amblyseius andersoni* (Chant 1957)**

Material examined — 4 ♀♀. 1 ♀ (Fatsa, N40°59'0.25" E37°25'54.74", 70 m, 06.VIII.2018), 1 ♀ (Perşembe, N41°4'51.30" E37°37'50.47", 28 m, 26.VII.2018), 1 ♀ (Perşembe, N41°4'29.02"

E37°43'52.77", 455 m, 26.VII.2018), 1 ♀ (Perşembe, N41°0'26.05" E37°49'22.80", 6 m, 26.VII.2018)

Remarks — *Amblyseius andersoni* was first described from prunes in Canada by Chant (1957a). This predatory mite is found in over 30 countries worldwide (Demite *et al.* 2023). It also has been recorded in different habitats in Türkiye multiple times (Faraji *et al.* 2011; Çobanoğlu *et al.* 2020; Döker *et al.* 2020; Miroğlu and Çıkman 2022). In the current research area, it was previously discovered on persimmon (*D. kaki*) (Akyazı *et al.* 2017), vegetables (*S. melongena*, *C. annuum*, *C. sativus*) (Soysal and Akyazı 2018), stone fruits (*P. avium*, *P. domestica*, *P. persica*) (Altunç and Akyazı 2019) and *P. laurocerasus* (Akyazı *et al.* 2022b). *Amblyseius. andersoni* was classified as a Type 3 lifestyle (Subtype III-b) generalist predator living on glabrous leaves (McMurtry *et al.* 2013). According to Camporese and Duso (1995) and Duso *et al.* (2003), it was observed to be more abundant and effective as a predator of spider mites on grape varieties with more glabrous leaves (McMurtry *et al.* 2013). *Polyphagotarsonemus latus*, found in the current study, was given as a targeted species by *A. andersoni* (BFG, 2024; Terralink, 2024). Additionally, it has been reported that this predator can feed on fungi (Pozzebon and Duso 2008; McMurtry *et al.* 2013).

***Amblyseius bryophilus* Karg 1970**

Material examined — 1 ♀ (İkizce, N41° 0'38.45" E37°1'36.16", 527 m, 31.VII.2019)

Remarks — *Amblyseius bryophilus* was first described on moss and humus in Germany by Karg (1970). It has been found in various countries worldwide including France, Hungary, Netherlands, Poland, Serbia, and Türkiye (Demite *et al.* 2023). In Türkiye, this species was collected from *P. vulgaris* in Rize province (Döker *et al.* 2014a, 2020), *M. domestica* (Akyol and Akyazı 2022) and *P. laurocerasus* trees (Akyazı *et al.* 2022b) in Ordu. According to McMurtry *et al.* (2013), *Amblyseius* spp. are classified as generalist predators with a Type III lifestyle. Additionally, it was found that most *Amblyseius* species live on glabrous leaves (subtype III-b), with some species found in soil/litter habitats (subtype III-e). It has also been observed that species with smooth bodies (mostly minute setae and no ornamentation of dorsal shield), such as *Amblyseius* spp., inhabit smooth leaves. However, there is no information directly on *A. bryophilus*'s feeding habits and habitat preferences.

***Amblyseius herbicolus* (Chant 1959)**

Material examined — 6 ♀♀. 1 ♀ (Altınordu, N40°57'8.13" E37°56'18.50", 4 m, 02.IX.2019), 1 ♀ (Altınordu, N40°56'50.42" E37°56'20.31", 9 m, 02.IX.2019), 1 ♀ (Fatsa, N40°58'7.31" E37°34'15.96", 273 m, 06.VIII.2018), 1 ♀ (Fatsa, N40°58'39.92" E37°36'41.00", 178 m, 06.VIII.2018), 1 ♀ (Gülyalı, N40°57'17.05" E38°0'10.76", 10 m, 02.IX.2019), 1 ♀ (Gülyalı, N40°58'37.75" E37°59'56.64", 4 m, 02.IX.2019)

Remarks — *Amblyseius herbicolus* was originally described from Portugal, intercepted at Boston, Massachusetts, USA on Bromeliaceae (Chant, 1959). This predatory mite is known in more than 50 countries around the world (Demite *et al.* 2023). In Türkiye, it was first reported on *D. kaki* and *D. lotus* trees in Ordu by Akyazı *et al.* (2016a). Later, this phytoseiid species was also found on stone (Altunç and Akyazı 2019) and pome fruit trees (Akyol and Akyazı 2022) in Ordu, citrus in Artvin, Giresun, Rize (Döker *et al.* 2020). This mite is classified as Subtype II-c-Generalist predators, which live in confined spaces on dicotyledonous plants. It has been observed to occur in domatia (McMurtry *et al.* 2013). It is known to be one of the most abundant and frequent phytoseiids associated with the pest mite species *Brevipalpus phoenicis* (Geijskes) (Trombidiformes: Tenuipalpidae) and *Oligonychus ilicis* (McGregor) (Trombidiformes: Tetranychidae) in Brazilian coffee crops (Reis *et al.* 2007). Moreover, the species has the potential to control *P. latus* (Rodriguez-Cruz *et al.* 2013).

***Proprioseiopsis okanagensis* (Chant 1957b)**

Material examined — 1 ♀ (Kabadüz, N40°49'36.35" E37°52'40.IX", 703 m, 14.VI.2018)

Remarks — *Proprioseiopsis okanagensis* was originally reported from peaches in Canada by Chant (1957b). Later, it was recorded in Austria, Azerbaijan, Canada, China, Czech Republic, Finland, France, Germany, Georgia, Greece, Greenland, Hungary, Iceland, Iran, Kazakhstan, Latvia, Moldova, Netherlands, Norway, Poland, Russia, Slovakia, Slovenia, Sweden, Türkiye, Ukraine, USA (Kazemi *et al.* 2022; Demite *et al.* 2023; Farazmand *et al.* 2023). *Proprioseiopsis* species are typically found in soil or litter habitats. Before this study, it was collected from *Malus communis* L. (Rosaceae) in Erzurum (Çobanoğlu 1989a), *Rosa canina* L., *Rosa damascena* (Mill.) (Rosaceae) in Ankara (Çobanoğlu and Bayram 1999), and *Cucurbita* sp. (Soysal and Akyazı 2018) in Ordu Türkiye. Although this group of mites is common in different parts of the world, very little is known about their biology. The few papers dealing with the biology of these mites refer to their ability to consume mites found on the aerial plant parts as prey. Some species of *Proprioseiopsis* are classified as Type I lifestyle-Specialized mite predators/subtype I-c, specialized predators of tydeids (Momen 2011). On the other hand, most *Proprioseiopsis* have Subtype III-e lifestyle, Generalist predators from soil/litter habitats, (Salmane and Petrova 2002; McMurtry *et al.* 2013).

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

Material examined — 1 ♀ (Gülyalı, N40°56'54.57" E38° 2'6.78", 380 m, 18.IX.2019)

Remarks — *Euseius finlandicus* is a globally widespread species, with a presence in 57 countries based on Demite *et al.* (2023). This predatory mite was described by Oudemans (1915) based on the material collected from *Salix caprea* L. (Salicaceae) in Finland. The species was very common in different habitats around the world. It commonly occurs on various plants in Türkiye (Faraji *et al.* 2011). In previous studies in Ordu, which is the field of this study, *E. finlandicus* was collected from vegetables (Soysal and Akyazı 2018), stone (Altunç and Akyazı 2019), and pome (Akyazı *et al.* 2017; Akyol and Akyazı 2022) fruits. It was classified as Type 4 lifestyle, pollen-feeding generalist predator (McMurtry *et al.* 2013). Many members of this genus prefer glabrous leaves (Moraes *et al.* 1986; McMurtry *et al.* 2013). This species was collected from pubescent kiwi leaves in the current study, although it has also been reported mainly on glabrous substrates (Kabicek 2005, 2008; McMurtry *et al.* 2013). Kabicek (2008) has reported the common occurrence of this species in the glabrous region of the leaves of *Corylus avellana* L. (Betulaceae) moving to pubescent patches when disturbed. Additionally, type IV lifestyle phytoseiids contain species for which pollen constitutes an important part of the diet. It is known to feed on species including tetranychid, eriophyid, tyroglyphid, and tarsonemid mites, as well as pollen, fungal hyphae and spores, insect eggs and larvae, honeydew, and plant fluids. (Schausberger 1992; Kostainen and Hoy 1994; Abdallah *et al.* 2001). Additionally, Akyol and Akyazı (2022) found that the pair of *E. finlandicus* and *B. rubrioculus* had a very strong positive relationship. Schausberger (1997) reported that *E. finlandicus* tended to prey on motile immatures of *T. pyri* and *Kampimodromus aberrans* (Oudemans) (Mesostigmata: Phytoseiidae). Similarly, Akyol and Akyazı (2022) discovered that the pair of *E. finlandicus* and *T. rapidus* had a very highly positive association.

***Euseius amissibilis* Meshkov, 1991 [= *E. gallicus* Kreiter & Tixier 2010 (Döker *et al.*, 2024)]**

Material examined — 4 ♀♀. 1 ♀ (Altnordu, N40°56'50.42" E37°56'20.31", 9 m, 02.IX.2019), 1 ♀ (Gülyalı, N40°56'54.57" E38° 2'6.78", 380 m, 18.IX.2019), 1 ♀ (Gülyalı, N40°57'7.30" E38°2'33.06", 369 m, 18.IX.2019), 1 ♀ (Ünye, N41°6'18.31" E37°19'39.58", 9 m, 18.VII.2018)

Remarks — *Euseius gallicus* was first reported on *Tilia platyphyllos* Scopoli (Tiliaceae), *P. cerasus*, *Aesculus hippocastanum* L. (Sapindaceae), and *Viburnum tinus* L. (Adoxaceae) in France by Tixier *et al.* (2009). It was also collected in Belgium (Döker *et al.* 2014b), Germany (Döker *et al.* 2014b), Italy (Tsolakis and Ragusa 2017), Slovenia (Chatti *et al.* 2017), Netherlands (Siepel *et al.* 2018), France (Tixier *et al.* 2020), Mauritius (Kreiter and Abo-Shnaf 2020) and Türkiye (Döker *et al.* 2014b; Soysal and Akyazı 2018; Çakır *et al.* 2020; Akyazı *et al.* 2024).

al. 2022b). In Türkiye, the species was recorded on *Ipomoea* sp. (Convolvulaceae) in Trabzon (Döker *et al.* 2014b), vegetables (Soysal and Akyazı 2018), and *P. laurocerasus* (Akyazı *et al.* 2022b) in Ordu as well as walnut leaves in Samsun (Çakır *et al.* 2020). This mite is a Type IV generalist predator that feeds on pollen (Kreiter *et al.* 2020). However, a recent study, Döker *et al.* (2024), noted that *E. gallicus* is a junior synonym of *E. amissibilis*

***Euseius stipulatus* (Athias & Henriot 1960)**

Material examined — 5 ♀♀. 4 ♀♀ (Ünye, N41°6'59.85" E37°15'16.46", 76 m, 18.VII.2018), 1 ♀ (Ünye, N41°7'1.20" E37°15'15.81", 74 m, 18.VII.2018)

Remarks — *Euseius stipulatus* has a worldwide distribution and has been detected in 21 countries across the globe according to Demite *et al.* (2023). This species was originally described from Algeria by Athias-Henriot (1960). While *E. stipulatus* is a common species found on many plants, it is particularly abundant in citrus orchards as reported by Sahraoui *et al.* (2012). Before this study, the species was known to be present in Türkiye and was collected from *Citrus* spp. and *C. sativus* (Farajı *et al.* 2011), as well as apple leaves (Akyol and Akyazı 2022). *E. stipulatus* is a Type IV lifestyle phytoseiid mite (McMurtry *et al.* 2013). Cruz-Miralles *et al.* (2021) reported that it is a zoophytophagous mite, which can engage in direct plant feeding on sour orange (*Citrus aurantium* L. (Rutaceae)) and Cleopatra mandarin (*Citrus reshni* hort. ex Tan (Rutaceae)). Additionally, it was found that *E. stipulatus* adversely affected the control of *Tetranychus urticae* Koch (Trombidiformes: Tetranychidae) in Clementine orchards in Spain by negatively impacting the establishment of *Neoseiulus californicus* (McGregor) and *P. persimilis* (Abad-Moyano *et al.* 2010; McMurtry *et al.* 2013). Even if no clear correlation, *E. stipulatus* and *Tetranychus* sp. were also observed in citrus orchards in Tunisia (Sahraoui *et al.* 2014).

***Neoseiulus umbraticus* (Chant 1956)**

Material examined — 2 ♀♀. 1 ♀ (İkizce, N41° 3'9.03" E36°59'1.39", 510 m, 31.VII.2019), 1 ♀ (Perşembe, N41°4'29.02" E37°43'52.77", 455 m, 26.VII.2018)

Remarks — *Neoseiulus umbraticus* was first described in England on *Rubus fruticosus* L. (Rosaceae) by Chant (1956) and then recorded mainly in 31 countries worldwide (Demitte *et al.* 2023). In Türkiye, it was recorded on cucumber (Çobanoğlu 1989b), hazelnut (Çobanoğlu and Özman 2002) and persimmon (Akyazı *et al.* 2016a, 2017). There are only a few studies on the biology of this species. Sengonca and Drescher (2001) investigated the impact of feeding on *Thrips tabaci* Lindeman (Thysanoptera: Thripidae) on the biological parameters of this species, compared to *T. urticae*. Kazak *et al.* (2002) demonstrated that this species can feed on *T. urticae* under laboratory conditions. It was also discovered that *N. umbraticus* can develop and reproduce on *P. ulmi*, *Calvolia lordi* (Nesbitt) (Sarcoptiformes: Winterschmidtidae), *Aculus schlectendali* (Nalepa) (Trombidiformes: Eriophyidae), and adults of *Quadraspidiotus perniciosus* (Comstock) (Hemiptera: Diaspididae), as well as on apple and cherry pollens. Eggs, larvae and protonymphs of *T. urticae* were the preferred prey for all stages of *N. umbraticus* (Knisley and Swift 1971). In addition, Wainstein and Vartapetov (1973) reported that it feeds on *Panonychus citri* (McGregor) (Trombidiformes: Tetranychidae) and *T. urticae*.

***Typhlodromips sessor* (De Leon 1962)**

Material examined — 2 ♀♀. 1 ♀ (Altınordu, N40°54'36.26" E37°50'22.97", 140 m, 02.IX.2019), 1 ♀ (Fatsa, N40°58'39.37" E37°24'59.45", 96 m, 06.VIII.2018)

Remarks — De Leon (1962) first described *Typhlodromips sessor* from material collected from *Vernonia* sp. (Asteraceae) and apple leaves in Tennessee, USA. Later, the species were collected from Canada (Sciarappa *et al.* 1977), USA (Denmark and Evans 2011), Japan (Toyasima *et al.* 2014) and Türkiye (Samsun) (Baş *et al.* 2022). In Türkiye, Baş *et al.* (2022) reported it from *Populus deltoides* Bartr. Ex Marsh (Salicaceae) leaves in Samsun.

***Phytoseius finitimus* Ribaga 1904**

Material examined — 9 ♀♀. 1 ♀ (Altınordu, N40°56'40.11" E37°47'7.66", 366 m, 02.IX.2019), 1 ♀ (Fatsa, N40°57'29.03" E37°37'33.74", 163 m, 06.VIII.2018), 1 ♀ (Gülyalı, N40°58'18.10" E38° 2'11.96", 0 m, 18.IX.2019), 1 ♀ (Gülyalı, N40°58'37.75" E37°59'56.64", 4 m, 02.IX.2019), 1 ♀ (İkizce, N41°4'29.84" E37°0'40.80", 490 m, 31.VII.2019), 1 ♀ (Perşembe, N40°59'39.76" E37°48'54.06", 15 m, 26.VII.2018), 1 ♀ (Perşembe, N40°59'32.68" E37°48'47.75", 16 m, 26.VII.2018), 2 ♀♀ (Ünye, N41°5'56.20" E37°22'27.90", 37 m, 18.VII.2018)

Remarks — *Phytoseius finitimus* was first discovered on *Buddleja madagascariensis* Lamarck (Scrophulariaceae) in Italy by Ribaga (1904). It is a widely distributed predatory species found in 18 countries worldwide (Demite *et al.* 2023). It is also a very common predatory species in Türkiye (İncekulak and Ecevit 2002; Akyazı and Ecevit 2003; Farajı *et al.* 2011; Gençer Gökçe *et al.* 2022; Miroğlu and Çıkman 2022). In the current study area, it was previously collected from various habitats including persimmon trees (Akyazı *et al.* 2017), vegetables (Soysal and Akyazı 2018), stone (Altunç and Akyazı 2019), and pome (Akyol and Akyazı 2022) fruits. It belongs to subtype III-a, which are generalist predators that live on pubescent leaves (leaves with trichomes) (McMurtry *et al.* 2013). The species' small, compressed idiosoma aids in moving between trichomes (Kreiter *et al.* 2003; Tixier *et al.* 2007). It was found that the species is commonly found on hairy plants (Pappas *et al.* 2013). *Phytoseius finitimus* has stout, usually serrate setae on its dorsal shield. It can colonize microhabitats that larger phytoseiids cannot, avoiding competition and escaping predation (Seelman *et al.* 2007). It takes advantage of the presence of prey that also prefer the same microhabitat. In addition, Duso and Vettorazzo (1999) indicated that *P. finitimus* could be potentially effective in controlling *P. ulmi* on grape plants. Pappas *et al.* (2013) also declared that the species is a natural enemy of both tetranychid and eriophyid mites. It can feed on pollen.

Conclusions

According to the study results, kiwi vines in Ordu have a rich fauna of beneficial mites due to the non-usage of pesticides. It is crucial to protect these mites in their environment, as they may hold the potential for biological control of pests in important fruit crops. On the other hand, various harmful mite species have also been identified. It is necessary to monitor the populations of these species and keep them under control in case they become potentially harmful to kiwi in the future. In future studies, it would also be possible to establish the relationships between these two mite groups.

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