



## Species complexes of leaf-inhabiting mites on *Prunus laurocerasus* L. (Rosaceae) trees in Ordu, Turkey

Rana AKYAZI<sup>1,2</sup> , Mete SOYSAL<sup>1</sup> , Yunus Emre ALTUNÇ<sup>1</sup> 

<sup>1</sup> Plant Protection Department, Faculty of Agriculture, Ordu University, Ordu, Turkey

<sup>2</sup> Corresponding author: ranaakyazi@odu.edu.tr

Received: 16 September 2021

Accepted: 28 October 2021

Available online: 27 January 2022

**ABSTRACT:** *Prunus laurocerasus* L. (Rosaceae) is a summer fruit and evergreen species belonging to the family Rosaceae. It is also known as cherry laurel, common laurel, and sometimes English laurel. This plant grows naturally in the North-Eastern region of Turkey. The aim of the study was to investigate the mite species on *P. laurocerasus* trees in eleven municipalities (Altınordu, Akkuş, Çaybaşı, Fatsa, Gülyalı, İkizce, Kabadüz, Kumru, Perşembe, Ulubey and Ünye) of the Ordu province (Eastern Black Sea Region, Turkey) in 2015 and 2016. Leaf samples were taken weekly from late April until early October in each year. At each sampling date, leaves were taken from different parts of the tree canopy, i.e. lower, middle and upper. The number of sampled trees was determined according to the total number of the trees in each orchard. Approximately 20 leaves per *P. laurocerasus* tree were taken. A total of eighteen mite species belonging to three orders, six families and twelve genera were identified including Phytoseiidae (7), Tydeidae (5), Tetranychidae (2), Stigmaeidae (2), Iolinidae (1) and Winterschmidtidae (1) during the study. According to the results, *P. laurocerasus* trees have an especially rich fauna of beneficial mites probably due to lack of pesticide usage.

**Keywords:** Cherry laurel, fauna, diversity, pest mites, predatory mites.

**Zoobank:** <http://zoobank.org/7273CC64-63E1-491E-871E-91410A111F66>

### INTRODUCTION

*Prunus laurocerasus* L. is an evergreen shrub or small to medium-sized tree, growing to 5 to 15 meters tall, with ovoid dark purple to blackish fruit 8-20 mm in diameter belonging to the family Rosaceae (Kolaylı et al., 2003; Bracewell, 2005; Sulusoglu and Cavusoglu, 2010). It is also known as cherry laurel, common laurel, and sometimes English laurel. This plant grows naturally in the region bordering the Black Sea in southwestern Asia and southeastern Europe. It is widely distributed in the North-Eastern region of Turkey. Moreover, it is declared that this tree imported to Europe from Turkey in the 16<sup>th</sup> century.

This plant is exhibited its diuretics and antidiabetic effects, also used to treatment of digestive system problems, stomach ulcers, hemorrhoids, eczemas, bronchitis (Milan, 1984; Baytop, 1989; Kolaylı et al., 2003). *P. laurocerasus* is also known to have insecticidal activity on arthropods (Rattan and Sharma, 2011; Akyazı et al., 2015). The fruit which has unique taste is consumed directly both fresh and dried and used as raw material for the preparation of food product such as jam, pulp, marmalade, and drinks (Ayaz, 1997; Kolaylı et al., 2003). It is widely consumed in the eastern Black Sea region (Kolaylı et al., 2003). It can also be used to create a tall sized hedge or screen and has become popular garden plants (Sulusoglu and Cavusoglu, 2010). Cherry laurel has endless benefits, and it is clear that the plant seems promising for the future. In this case, until now, it is a big gap of the lack of an investigation about pests, damage to cherry laurel, and their related natural enemies in Turkey. Moreover, few studies have focused on this subject abroad. Among them, it is reported by Navajas et al. (1996) and Witters et al.

(2007) that *P. laurocerasus* is among one of the host plants of citrus red mite, *Panonychus citri* (McGregor) (Acari: Tetranychidae). Hale (2007) and Denmark et al. (2018) shared just a photo of symptoms of *Oligonychus ilicis* (McGregor) (Acari: Tetranychidae) on *P. laurocerasus* leaves.

To fill these literature gaps, the overall goal of this work was to determine mite species on *P. laurocerasus* trees in eleven municipalities (Altınordu, Akkuş, Çaybaşı, Fatsa, Gülyalı, İkizce, Kabadüz, Kumru, Perşembe, Ulubey and Ünye) of the Ordu province (Eastern Black Sea Region, Turkey) during 2015-2016.

### MATERIALS AND METHODS

The surveys were carried out during 2015 and 2016 on *P. laurocerasus* trees in Ordu provinces. Leaf samples were collected from eleven municipalities including Altınordu, Akkuş, Çaybaşı, Fatsa, Gülyalı, İkizce, Kabadüz, Kumru, Perşembe, Ulubey and Ünye of Ordu province in the Black Sea region (Fig. 1). Geographical coordinates were recorded using a GPS mobile device.

### Sampling of *Prunus laurocerasus* trees

Samplings were carried out weekly between April and October in 2015 and 2016. On each sampling date, leaves were taken from different parts of the tree canopy, i.e. lower, middle and upper. The number of sampled trees per site was determined according to the total number of the trees in each orchard (Table 1). Approximately 20 leaves per tree were collected. The samples were put into paper bags placed inside plastic bags, labeled, and transferred to the laboratory.



**Figure 1.** Eleven sampled areas in Ordu, Turkey (Black Sea Region) during the 2015 and 2016.

**Table 1.** The number of sampled *Prunus laurocerasus* trees during the 2015 and 2016 growing seasons in Ordu, Turkey (Black Sea Region), according to the total number of trees in each sampling area (Madanlar, 1991).

| Total number of trees in each sampling area | The number of sampled trees      |
|---|----------------------------------|
| 0- 50                                       | All trees                        |
| 51-200                                      | 50 trees                         |
| 201-400                                     | 60 trees                         |
| More than 400                               | 20% of the total number of trees |

### Extraction and preparation of mite specimens

The mites were collected with a 0 or 00 paint brush under a stereomicroscope (Leica S8 APO) directly from the leaves. Specimens were preserved in vials containing 70% ethanol. All mites were cleared in lactophenol. Each mite was mounted in Hoyer's medium on microscope slides and dried for 5-7 days in an oven at 50°C according to the method of Krantz and Walter (2009).

### Identification of mite specimens

The mites were identified to species level using the relevant identification keys such as Pritchard and Baker (1955), Meyer (1987), Zhang et al. (2002), Zhang (2003), Seeman and Beard (2011), Ueckermann and Çobanoğlu (2012), Auger et al. (2013) for the family Tetranychidae, Gonzalez-Rodriguez (1965), Fan and Zhang (2005), Saccaggi and Ueckermann (2018) for Stigmaeidae, Baker (1968, 1970), Castagnoli (1984), Andre (2011), Ueckermann (2013), Ripka et al. (2013), Akyazi et al. (2017), Ueckermann et al. (2019) for Iolinidae and Tydeidae,

Muma and Denmark (1970), Çobanoğlu (1989a,b,c, 1993a,b,c,d), Faraji et al. (2007, 2011), Tixier et al. (2009), Döker et al. (2014a,b, 2016, 2020) for Phytoseiidae, Fain (1972), Moser and Bogenschütz, (1984), Fain and Rack (1987) and Krantz and Walter (2009) for Winterschmidtiidae. Mite species were identified under a light microscope (Leica DM 2500, Heerbrugg, Switzerland) equipped with phase contrast.

Confirmation of species identification and some of identifications were made in School of Biological Sciences/Zoology, North-West University by Prof. Dr. Edward Albert Ueckermann. The mite specimens were deposited in the Mite Collection at the Ordu University, Agricultural Faculty, Plant Protection Department, Ordu, Turkey.

### RESULTS AND DISCUSSION

During the study, a total of 344 mite specimens in various development stages were examined: 341 adults (308 females, 33 males), 3 nymphs. A total of 18 mite species belonging to 3 orders, 6 families and 12 genera were identified as follows: seven species of Phytoseiidae, five Tydeidae, two Tetranychidae, two Stigmaeidae, one for each of Iolinidae and Winterschmidtiidae (Table 2).

#### Family Phytoseiidae Berlese

##### *Transeius wainsteini* (Gomelaui)

Material examined: 6♀♀ (Altınordu, 29.06.2016), 4♀♀ (Altınordu, 21.07.2015), 2♀♀ (Altınordu, 31.07.2015), 6♀♀, 1♂ (Perşembe, 12.08.2015), 10♀♀ (Ulubey, 20.09.2016), 2♀♀ (Ulubey, 01.10.2015), 14♀♀, 1♂ (İkiçe, 11.08.2016), 3♀♀, 1♂ (Fatsa, 11.08.2015), 2♀♀, 1♂ (Fatsa, 14.06.2016), 7♀♀, 1♂ (Ünye, 03.08.2015), 1♀ (Ünye,

22.06.2016), 1♀ (Gülyalı, 19.08.2015), 2♀♀ (Kabadüz, 09.08.2016), 4♀♀, 1♂ (Çaybaşı, 11.08.2016)

Comments: *Transeius wainsteini* has been recorded in Denmark, Georgia, Germany, Russia, Iran, Slovakia and Turkey (Demite et al., 2017). In Turkey, it was found on *Rosa canina* L. (Rosales) in Giresun (Faraji et al., 2011), persimmon trees (Akyazi et al., 2016, 2017), vegetables (Soysal and Akyazi, 2018), stone (Altunç and Akyazi, 2019) and pome (Akyol, 2019) fruit trees in Ordu. It was

collected among the *Panonychus ulmi* (Koch) (Trombidiformes: Tetranychidae) and *Aceria* sp. (Trombidiformes: Eriophyidae) population on wild apple trees in Iran by Rahmani et al. (2010). On the other hand, it was found in association with *T. urticae* in hazelnut orchards and sunflower by the same researchers. Moreover, Tajmiri et al. (2014) notified that this predator has probably survived using alternative food (such as pollen) at the lack of prey times.

**Table 2.** Mite species collected from *Prunus laurocerasus* trees during the 2015 and 2016 growing season in the eleven different sampling areas (Altınordu, Akkuş, Çaybaşı, Fatsa, Gülyalı, İkizce, Kabadüz, Kumru, Perşembe, Ulubey and Ünye) in Ordu, Turkey (Black Sea Region).

| Order                                   | Family/Species  | Number of mite specimens |           |          |            |
|---|---|--------------------------|-----------|----------|------------|
|   |   | ♀                        | ♂         | N        | TOTAL      |
| Mesostigmata                            | Phytoseiidae  | <b>163</b>               | <b>8</b>  | -        | <b>171</b> |
|   | <i>Transeius wainsteini</i> (Gomelaui)                | 64                       | 6         |          | 70         |
|   | <i>Amblyseius herbicolus</i> Chant                    | 54                       | -         | -        | 54         |
|   | <i>Amblyseius andersoni</i> (Chant)                   | 36                       | 2         | -        | 38         |
|   | <i>Amblyseius bryophilus</i> Karg                     | 3                        | -         |          | 3          |
|   | <i>Euseius stipulatus</i> (Athias-Henriot)            | 3                        | -         | -        | 3          |
|   | <i>Euseius gallicus</i> Kreiter and Tixier            | 1                        | -         | -        | 1          |
|   | <i>Paraseiulus triporus</i> (Chant and Yoshida-Shaul) | 2                        | -         | -        | 2          |
| Trombidiformes                          | Tetranychidae   | <b>34</b>                | <b>5</b>  | <b>3</b> | <b>42</b>  |
|   | <i>Panonychus citri</i> (McGregor)                    | 28                       | 4         | 2        | 34         |
|   | <i>Tetranychus urticae</i> Koch                       | 6                        | 1         | 1        | 8          |
|   | Stigmaeidae   | <b>2</b>                 | -         | -        | <b>2</b>   |
|   | <i>Agistemus collyerae</i> Gonzalez                   | 1                        | -         | -        | 1          |
|   | <i>Zetzellia mali</i> (Ewing)                         | 1                        | -         | -        | 1          |
|   | Tydeidae  | <b>88</b>                | <b>20</b> | -        | <b>108</b> |
|   | <i>Tydeus californicus</i> (Banks)                    | 45                       | 9         | -        | 54         |
|   | <i>Tydeus goetzi</i> Schruft                          | 42                       | 9         | -        | 51         |
|   | <i>Tydeus calabrus</i> (Castagnoli)                   | -                        | 1         | -        | 1          |
|   | <i>Tydeus plumosus</i> Karg                           | 1                        | -         | -        | 1          |
|   | <i>Brachytydeus paraobliqua</i> Panou & Emmanuel      | -                        | 1         | -        | 1          |
|   | Iolinidae   | <b>4</b>                 | -         | -        | <b>4</b>   |
| <i>Pronematus ubiquitous</i> (McGregor) | 4   | -                        | -         | 4        |            |
| Sarcoptiformes                          | Winterschmidtiidae                                    | <b>17</b>                | -         | -        | <b>17</b>  |
|   | <i>Calvolia</i> sp. Oudemans                          | 17                       | -         | -        | 17         |
| <b>TOTAL</b>                            |   | <b>308</b>               | <b>33</b> | <b>3</b> | <b>344</b> |

N: Nymph

### ***Amblyseius herbicolus*** Chant

Material examined: 7♀♀ (Ulubey, 01.10.2015), 2♀♀ (Ulubey, 20.09.2016), 2♀♀ (Ünye, 03.08.2015), 17♀♀ (Perşembe, 12.08.2015), 8♀♀ (Gülyalı, 19.08.2015), 9♀♀ (Altnordu, 21.07.2015), 9♀♀ (Altnordu, 31.07.2015).

Comments: *Amblyseius herbicolus* has very wide distribution in the world (Demite et al., 2017). In Turkey, this predatory species was firstly reported on persimmon trees in Ordu by Akyazı et al. (2016). Altunç and Akyazı (2019), Akyol (2019) and Döker et al. (2020) also found it on stone, pome and citrus fruit trees, respectively. This mite was classified as Subtype III-c-Generalist predators living in confined space on dicotyledonous plants by McMurtry et al. (2013).

### ***Amblyseius andersoni*** (Chant)

Material examined: 2♀♀ (Altnordu, 29.06.2016), 13♀♀ (Altnordu, 21.07.2015), 1♀, 1♂ (Perşembe, 12.08.2015), 8♀♀ (Ünye, 03.08.2015), 2♀♀ (Ünye, 22.06.2016), 1♀ (İkizce, 11.08.2016), 4♀♀ (Fatsa, 11.08.2015), 2♀♀ (Ulubey, 20.09.2016), 1♀ (Ulubey, 01.10.2015), 1♀ (Gülyalı, 19.08.2015), 1♀, 1♂ (Kumru, 29.07.2016).

Comments: *Amblyseius andersoni* is a very common predatory mite species which shows distribution in more than thirty countries (Demite et al., 2017). In Turkey, it was reported on different plants by many researchers (Çobanoğlu, 1992; Akyazı and Ecevit, 2003, 2005; Çobanoğlu, 2004; İnal, 2005; Yanar and Ecevit, 2005; Bayram and Çobanoğlu, 2007; Kumral and Kovancı, 2007; Özşişli and Çobanoğlu, 2011; Yeşilayer and Çobanoğlu, 2011; Farajı et al., 2011; Özsayın, 2012; Satar et al., 2013; Kasap et al., 2013; Gençer-Gökçe, 2015; Kumral and Çobanoğlu, 2015a,b; Çobanoğlu and Kumral, 2016; Çobanoğlu and Güldalı, 2017; Akyazı et al., 2017; Soysal and Akyazı, 2018; Altunç and Akyazı, 2019; Çobanoğlu et al., 2020; Döker et al., 2020; Ersin et al., 2020). It was classified as Type III Lifestyle-generalist predators by McMurtry et al. (2013).

### ***Amblyseius bryophilus*** Karg

Material examined: 1♀ (Altnordu, 21.07.2015), 1♀ (Altnordu, 31.07.2015), 1♀ (Kabadüz, 09.08.2016).

Comments: *Amblyseius bryophilus* was firstly recorded from Germany by Karg (1970). It is also known in France, Hungary, Poland, Serbia, and Turkey (Demite et al., 2017). In Turkey, *A. bryophilus* was recorded for the first time from Rize province by Döker et al. (2014a). This species was also found on pome fruit trees in Ordu (Akyol, 2019) and *Phaseolus vulgaris* (Fabaceae) in Rize (Döker et al., 2020). *Amblyseius* spp. were classified as generalist predators-Type III lifestyle (Croft et al., 2004).

### ***Euseius stipulatus*** (Athias-Henriot)

Material examined: 2♀♀ (Gülyalı, 19.08.2015), 1♀ (Altnordu, 29.06.2016).

Comments: *Euseius stipulatus* is a common predatory mite worldwide (Demite et al., 2017). It was recorded on citrus (McMurtry, 1977; Çobanoğlu, 1989b), cucumber (Çobanoğlu, 1989a), pome fruits (Akyol, 2019), walnut leaves (Çakır et al., 2020) and olive trees (Ersin et al., 2020) in Turkey. This species was classified as Type IV Lifestyle-Pollen feeding generalist predators by McMurtry et al. (2013).

### ***Euseius gallicus*** Kreiter and Tixier

Material examined: 1♀ (Ünye, 22.06.2016).

Comments: *Euseius gallicus* was reported for the first time on *Tilia platyphyllos* Scopoli (Tiliaceae), *Prunus cerasus* L. (Rosaceae), *Aesculus hippocastanum* L. (Sapindaceae) and *Viburnum tinus* L. (Adoxaceae) in France (Tixier et al., 2009). Later, it was determined in Belgium, France, Germany, Italy, Netherlands, Slovenia, Tunisia and Turkey (Demite et al., 2017). In Turkey, Döker et al. (2014b) recorded this predatory mite on *Ipomoea* sp. (Convolvulaceae). It was also found on vegetables in Ordu (Soysal and Akyazı, 2018) and walnut leaves in Samsun province (Çakır et al., 2020). This mite is a Type IV- pollen feeding generalist predator (Kreiter et al., 2020).

### ***Paraseiulus triporus*** (Chant and Yoshida-Shaul)

Material examined: 1♀ (Gülyalı, 19.08.2015), 1♀ (Altnordu, 21.07.2015).

Comments: *Paraseiulus triporus* was reported from almost thirty countries (Demite et al., 2017). In Turkey, this predatory species was firstly reported on quince, apple and cranberry by Çobanoğlu (2004). So far, many researchers found it on the different plants from different regions of Turkey (Kasap and Çobanoğlu, 2007; Yeşilayer and Çobanoğlu, 2011; Özşişli and Çobanoğlu, 2011; Özsayın, 2012; Erdoğan, 2013; Kasap et al., 2013; Satar et al., 2013; Gençer-Gökçe, 2015; Akyazı et al., 2017; İnak and Çobanoğlu, 2018; Akyol, 2019; Altunç and Akyazı, 2019; Keskin, 2019). McMurtry et al. (2013) classified *Paraseiulus* spp. as Subtype I-c- specialized predators of tydeids.

### Family **Tetranychidae** Donnadieu

### ***Panonychus citri*** (McGregor)

Material examined: 5♀♀ (Altnordu, 21.07.2015), 1♀ (Altnordu, 31.07.2015), 6♀♀, 1 nymph (Perşembe, 12.08.2015), 4♀♀, 3♂♂ (Fatsa, 14.06.2016), 1♀ (Ünye, 03.08.2015), 4♀♀ (Ünye, 22.06.2016), 7♀♀, 1♂, 1 nymph (Gülyalı, 19.08.2015).

Comments: *Panonychus citri* is a major pest of citrus and occasionally attacks grapes, ornamental flowers and evergreen shrubs grown in greenhouses and nurseries (Zhang, 2003). It was reported from all regions of the world (Migeon et al., 2011). *P. citri* was collected from different plants by Düzgüneş (1952), İnal (2005), Satar et al. (2013), Altunç and Akyazı (2019) in Turkey as well.

### ***Tetranychus urticae* Koch (Green form)**

Material examined: 2♀♀, 1♂, 1 nymph (Gülyalı, 19.08.2015), 1♀ (Ünye, 22.06.2016), 2♀♀ (Fatsa, 14.06.2016), 1♀ (Kumru, 29.07.2016).

Comments: *Tetranychus urticae* is a highly polyphagous and cosmopolitan species (Zhang, 2003; Migeon et al., 2011). It was reported by many researchers in Turkey as well (Ulusoy et al., 1999; Özman and Çobanoğlu, 2001; İncekulak and Ecevit, 2002; Yanar and Ecevit, 2005; İnal, 2005; Çetin et al., 2006; Ertop, 2006; Kumral and Kovancı, 2007; Kasap et al., 2008; Elma and Alaoğlu, 2008; Güven, 2008; Özsayın, 2012; Satar et al., 2013; Erdoğan, 2013; Çobanoğlu and Kumral, 2014; Gençer-Gökçe, 2015; Kumral and Çobanoğlu, 2015a,b; Kutlu, 2016; Akyazı et al., 2017; Çobanoğlu and Güldalı, 2017; Soysal and Akyazı, 2018; Akyol, 2019; Altunç and Akyazı, 2019; Keskin, 2019; Cilbircioğlu and Çobanoğlu, 2020; Çobanoğlu et al., 2020; Erdoğan and Çobanoğlu, 2020). On the other hand, we collected few individuals of *T. urticae* from each location. So, we think that these findings may be originated from accidental infestations. The sampled trees were close to hazelnut orchards. The hazelnut trees and also floor vegetation plants under *P. laurocerasus* trees can harbor *T. urticae* and may become a source of infestation for *P. laurocerasus* trees. This assumption might be addressed in future studies.

Family **Stigmaeidae** Oudemans

### ***Agistemus collyerae* Gonzalez**

Material examined: 1♀ (Perşembe, 12.08.2015).

Comments: The genera *Agistemus* Summers and *Zetzellia* Oudemans are the second most important predator group after Phytoseiidae (Gerson et al., 2003). Gonzalez-Rodriguez (1963) firstly reported *A. collyerae* in New Zealand. It was also found Australia, Iran, Italy, Portugal, Turkey (Fan et al., 2016) and South Africa (Saccaggi and Ueckermann, 2018). Saccaggi and Ueckermann (2018) declared that it was detected on products imported from USA, Chile, Yemen, Spain and France to South Africa. In Turkey, the predatory mite was found on *Quercus robur* L. (Fagaceae) and *Cupressocyparis leylandii* (A.B. Jacks. & Dallim.) (Cupressaceae) in İstanbul (Yeşilayer and Çobanoğlu, 2013) and *Malus domestica* Borkh. (Rosales) in Çanakkale (Kasap et al., 2013). It is known to feed on *Tetranychus lambi* Pritchard & Baker (Trombidiformes: Tetranychidae) and *Aculus fockeui* (Nalepa & Trouessart) (Trombidiformes: Eriophyidae) (Saccaggi and Ueckermann, 2018).

### ***Zetzellia mali* (Ewing)**

Material examined: 1♀ (Fatsa, 11.08.2015).

Comments: *Zetzellia mali* is widely distributed in the Holarctic region worldwide (Gonzalez-Rodriguez, 1965; Dönel and Doğan, 2013). It was found for the first time in Turkey by Düzgüneş (1963). Later, this species was collected from many provinces by many researchers (Akyazı

and Ecevit, 2003; İnal, 2005; Kasap and Çobanoğlu, 2007; Elma and Alaoğlu, 2008; Kasap et al., 2008, 2013; Özsayın, 2012; Satar et al., 2013; Çobanoğlu and Kumral, 2014; Kasap et al., 2014; Gençer-Gökçe, 2015; Kumral and Çobanoğlu, 2015a,b; Akyazı et al., 2016, 2017; Soysal and Akyazı, 2018; Akyol, 2019; Altunç and Akyazı, 2019; Keskin, 2019; Çobanoğlu et al., 2020; Erdoğan and Çobanoğlu, 2020). According to Croft (1994), it preys on eggs and immature stages of European red mite and active stages of apple rust mite. Khanjani and Ueckermann (2002) also declared that *Z. mali* tends to feed on eriophyid mite than adult tetranychid mites. It is known that *Z. mali* may feed on other predator mite eggs as well (Kain and Nyrop, 1995). Croft (1994) also noted that it can prey on eggs of the predatory phytoseiid mites *Typhlodromus occidentalis* (Nesbitt) and *Typhlodromus pyri* Scheuten (Mesostigmata: Phytoseiidae) and other *Z. mali*.

Family **Tydeidae** Kramer

### ***Tydeus californicus* (Banks)**

Material examined: 6♀♀, 1♂ (Altınordu, 29.06.2016), 10♀♀, 1♂ (Ünye, 03.08.2015), 14♀♀, 5♂♂ (Ünye, 22.06.2016), 1♀ (Fatsa, 14.06.2016), 1♀ (Çaybaşı, 11.08.2016), 2♀♀ (İkizce, 11.08.2016), 2♀♀ (Ulubey, 01.10.2015), 3♀♀ (Gülyalı, 19.08.2015), 4♀♀, 2♂♂ (Kumru, 29.07.2016), 2♀♀ (Akkuş, 04.06.2016).

Comments: *Tydeus californicus* is a cosmopolitan species (Tempfli et al., 2015). It has been reported on various hosts in Turkey by many researchers (Çobanoğlu, 1992; Çobanoğlu and Kazmierski, 1999; Özman and Çobanoğlu, 2001; İncekulak and Ecevit, 2002; Akyazı and Ecevit, 2003; Yanar and Ecevit, 2005; Kasap and Çobanoğlu, 2007; Kumral and Kovancı, 2007; Güven, 2008; Kasap et al., 2008; Özsisli and Çobanoğlu, 2011; Yeşilayer and Çobanoğlu, 2011; Özsayın, 2012; Erdoğan and Yanar, 2015; Kasap et al., 2013; Satar et al., 2013; Kasap et al., 2014; Gençer-Gökçe, 2015; Akyazı et al., 2017; Soysal and Akyazı, 2018; Akyol, 2019; Altunç and Akyazı, 2019; Çobanoğlu et al., 2020). Tempfli et al. (2015) notified that this species can play an important role in the management of rust mites.

### ***Tydeus goetzi* Schruft**

Material examined: 12♀♀, 4♂♂ (Altınordu, 31.07.2015), 4♀♀, 2♂♂ (Altınordu, 21.07.2015), 4♀♀ (Altınordu, 29.06.2016), 7♀♀, 2♂♂ (Perşembe, 12.08.2015), 14♀♀ (Gülyalı, 19.08.2015), 1♀ (Ünye, 03.08.2015), 1♂ (Kabadüz, 09.08.2016).

Comments: *Tydeus goetzi* has shown limited distribution in world. It was reported in Germany (Schruft, 1972), France (Andre, 2011), and Turkey (Akyazı et al., 2017; Soysal and Akyazı, 2018; Altunç and Akyazı, 2019; Akyol, 2019). According to Schruft (1972), *T. goetzi* feeds on *Colomerus vitis* (Pagenstecher) and *Calepitrimerus vitis* (Nalepa) (Trombidiformes: Eriophyidae).

### *Tydeus calabrus* (Castagnoli)

Material examined: 1♂ (Ünye, 03.08.2015).

Comments: *Tydeus calabrus* is a rarely- seen species of genus *Tydeus* Koch. Little is known of its distribution. Çobanoğlu and Kazmierski (1999) recorded this species from Turkey. Sadeghi et al. (2012) also mentioned it as a new record for Iran.

### *Tydeus plumosus* Karg

Material examined: 1♀ (Gülyalı, 19.08.2015).

Comments: *Tydeus plumosus* was recorded in apple orchards of Serbia (Stojnic et al., 2002) and on wheat in Diyarbakır (Sur) in Turkey (Ueckermann et al., 2019).

### *Brachytydeus paraobliqua* Panou and Emmanuel

Material examined: 1♂ (İkizce, 11.08.2016).

Comments: *Brachytydeus paraobliqua* was found in Greece (Panou and Emmanuel, 1996), Hungary (Ripka et al., 2002; Tempfli et al., 2015) and Turkey. In Turkey, it was firstly reported in Samsun by Özman-Sullivan et al. (2005). Later, it was found on *Diospyros kaki* Thunb. and *Diospyros lotus* L. (Ebenaceae) by Akyazı et al. (2017) and stone fruit trees by Altunç and Akyazı (2019) in Ordu.

Family **Iolinidae** Pritchard

### *Pronematus ubiquitus* (McGregor)

Material examined: 3♀♀ (Fatsa, 14.06.2016), 1♀ (Ünye, 22.06.2016).

Comments: This predator species is widely distributed in USA, Egypt and Africa (Baker, 1968). In Turkey, it was reported by Çobanoğlu (1992); Göven et al. (2009); Can and Çobanoğlu (2010); Kumral and Çobanoğlu (2015b); Akyol (2019); Ueckermann et al. (2019). According to Abou-Awad et al. (1999), *P. ubiquitus* can develop from larva to adult stage when feeds on individuals of the fig bud mite, *Eriophyes ficus* Cotte and the fig leaf mite, *Rhyncaphytoptus ficifoliae* Keifer (Trombidiformes: Eriophyidae).

Family **Winterschmidtidae** Oudemans

### *Calvolia* sp.

Material examined: 3♀♀ (Fatsa, 11.08.2015), 5♀♀ (Altınordu, 31.07.2015), 1♀ (Perşembe, 12.08.2015), 6♀♀ (Kabadüz, 09.08.2016), 2♀♀ (Altınordu, 29.06.2016).

Comments: Different species within the genus *Calvolia* have been reported from Germany (Moser and Bogenschütz, 1984), Bangladesh (Gupta and Sanyal, 2004), Poland, America and Ukrain (Krantz and Walter, 2009). In Turkey, *Calvolia* sp. was collected from vegetable (Soysal, 2016) and stone fruit (Altunç and Akyazı, 2019) leaves in Ordu. *Calvolia* spp. are deemed fungivorous by Krantz and Walter (2009).

In spite of seventeen females in the material, the species could not be identified to species level because of their damaged body parts, poor preparation of slides, lack of literature. This is an issue for future research to explore.

### Authors' contributions

**Rana Akyazı:** Planning the research, project administration, investigation, resources, survey and laboratory studies, assemble data, writing the manuscript, review and editing. **Mete Soysal:** Investigation, survey and laboratory studies, assemble data. **Yunus Emre Altunç:** Investigation, survey and laboratory studies, assemble data.

### Statement of ethics approval

Not applicable.

### Funding

Ordu University Scientific Research Project Coordination Unit (ODUBAP; Project No, AR-1516).

### Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

### Acknowledgments

The part of this research was presented on the third International Persian Congress of Acarology held between 23-25 August 2017 in Tehran, IRAN and published as an abstract in the book of abstracts. The authors gratefully acknowledge Prof. Dr. Edward Albert Ueckermann (School of Biological Sciences/Zoology, North-West University, South Africa) for the confirmation of species identification and some of identifications. We are also very thankful to anonymous reviewers for their deep, thorough review and constructive comments that helped us to improve the manuscript.

### REFERENCES

- Abou-Awad, B.A., El-Sawaf, B.M. and Abdel Kader, A.A. 1999. Life history and life table of *Pronematus ubiquitus* (Mcgregor) as a predator of eriophyoid mites in Egypt (Acari: Tydeidae). *Acarologia*, 40 (1): 29-32.
- Akyazı, F. and Ecevit, O. 2003. Determination of mite species in hazelnut orchards in Samsun, Ordu and Giresun provinces. *Ondokuz Mayıs Üniversitesi Ziraat Fakültesi Dergisi*, 18 (3): 39-45. [In Turkish]
- Akyazı, F. and Ecevit, O. 2005. Determination of population fluctuations of harmful and beneficial mites in hazelnut orchards of Samsun Province. *GOÜ, Ziraat Fakültesi Dergisi*, 22 (2): 13-18.
- Akyazı, R., Soysal, M. and Hassan, E. 2015. Toxic and repellent effects of *Prunus laurocerasus* L. (Rosaceae) extracts against *Tetranychus urticae* Koch (Acari: Tetranychidae). *Türkiye Entomoloji Dergisi*, 39 (4): 367-380.  
doi: 10.16970/ted.49593

- Akyazı, R., Ueckermann, E.A., Soysal, M., Akyol, D. 2016. Population dynamics of mites (Acari) on *Diospyros kaki* Thunb. and *Diospyros lotus* L. (Ebenaceae) trees in Ordu, Turkey. *Systematic and Applied Acarology*, 21 (10): 1334-1345.  
[doi:10.11158/saa.21.10.4](https://doi.org/10.11158/saa.21.10.4)
- Akyazı, R., Ueckermann, E.A., Akyol, D. and Soysal, M. 2017. Distribution of mite species (Acari) on persimmon trees in Turkey (Ordu), with one newly recorded mite species and one re-described species. *International Journal of Acarology*, 43 (8): 563-581.  
[doi: 10.1080/01647954.2017.1373149](https://doi.org/10.1080/01647954.2017.1373149)
- Akyol, D. 2019. Beneficial and harmful mite species on some pome fruit trees grown in Ordu province. Ms Dissertation. Institute of Natural and Applied Sciences, Ordu University, Ordu, Turkey, 210 pp. [In Turkish]
- Altunç, Y.E. and Akyazı, R. 2019. Mite species on stone fruit trees in Ordu province. *Anadolu Journal of Agricultural Sciences*, 34 (1): 18-34. [In Turkish]  
[doi: 10.7161/omuanajas.441274](https://doi.org/10.7161/omuanajas.441274)
- Andre, H.M. 2011. *Duges caudatus* is a Tenuipalpidae and not a Tydeidae (Acari). *Acarologia*, 51 (1): 69-85.  
[doi: 10.1051/acarologia/20111990](https://doi.org/10.1051/acarologia/20111990)
- Auger, P., Migeon, A., Ueckermann, E.A., Tiedt, L. and Navajas, M., 2013. Evidence for synonymy between *Tetranychus urticae* and *Tetranychus cinnabarinus* (Acari Prostigmata, Tetranychidae): Review and new data. *Acarologia*, 53 (4): 383-415.  
[doi: 10.1051/acarologia/20132102](https://doi.org/10.1051/acarologia/20132102)
- Ayaz, F.A. 1997. Studies on water soluble sugar and sugar alcohol in cultivar and wild forms of *Laurocerasus officinalis* Roem. *Pakistan Journal of Botany*, 29 (2): 331-336.
- Baker, E.W. 1968. The genus *Pronematus* Canestrini. *Annals of the Entomological Society of America*, 61 (5): 1091-1097.  
[doi: 10.1093/aesa/61.5.1091](https://doi.org/10.1093/aesa/61.5.1091)
- Baker, E.W. 1970. The genus *Tydeus*: subgenera and species groups with descriptions of new species (Acari: Tydeidae). *Annals of the Entomological Society of America*, 63 (1): 163-177.  
[doi: 10.1093/aesa/63.1.163](https://doi.org/10.1093/aesa/63.1.163)
- Bayram, Ş. and Çobanoğlu, S. 2007. Mite fauna (Acari: Prostigmata, Mesostigmata, Astigmata) of coniferous plants in Turkey. *Türkiye Entomoloji Dergisi*, 31 (4): 279-90.
- Baytop, T. 1989. Türkiye’de zehirli bitkiler, bitki zehirlenmeleri ve tedavi yöntemleri. Yayın 3560; İstanbul Üniversitesi Yayınları, İstanbul, Turkey, 290 pp. [In Turkish]
- Bracewell, R.N. 2005. *Trees of Stanford and Environs*. Stanford, CA, Stanford Historical Society.
- Can, M. and Çobanoğlu, S. 2010. Studies on the determination of mite (Acari) species and their hosts of greenhouse vegetables in Kumluca, Antalya. *Akdeniz Üniversitesi Ziraat Fakültesi Dergisi*, 23 (2): 87-92. [In Turkish]
- Castagnoli, M. 1984. Contributo alla conoscenza dei tedeidi (Acarina: Tydeidae) delle piante coltivate in Italia. *Redia*, 67: 307-322. [In Italian]
- Cilbircioğlu, C. and Çobanoğlu, S. 2019. Phytophagous mite (Acari) species on garlic (*Allium sativum* L.) cultivation areas and storages of Kastamonu, Turkey. *Persian Journal of Acarology*, 8 (3): 211-224.  
[doi:10.22073/pja.v8i3.46349](https://doi.org/10.22073/pja.v8i3.46349)
- Croft, B. A. 1994. Biological control of apple mites by a phytoseiid mite complex and *Zetzellia mali* (Acari: Stigmaeidae): long-term effects and impact of azinphosmethyl on colonization by *Amblyseius andersoni* (Acari: Phytoseiidae). *Environmental Entomology*, 23 (5): 1317-1325.  
[doi: 10.1093/ee/23.5.1317](https://doi.org/10.1093/ee/23.5.1317)
- Croft, B.A., Blackwood, J.S. and Mcmurtry, J.A. 2004. Classifying life-style types of phytoseiid mites: diagnostic traits. *Experimental and Applied Acarology*, 33 (4): 247-260.  
[doi: 10.1023/b:appa.0000038622.26584.82](https://doi.org/10.1023/b:appa.0000038622.26584.82)
- Çakır, S., Tixier, M.S. and Özman-Sullivan, S. 2020. Phytoseiid species (Acari: Phytoseiidae) on walnut trees in Samsun Province, Turkey. *Acarological Studies*, 2 (1): 24-33.
- Çetin, G., Hantaş, C. and Erenoğlu, B. 2006. The studies on fauna of harmful insects and mites determined in blackberry orchards in Yalova and Bursa provinces. *Bahçe*, 35 (1-2): 61-74. [In Turkish]
- Çobanoğlu, S. 1989a. Determination of the Phytoseiidae (Acarina: Mesostigmata) species from vegetable growing areas of Antalya. *Bitki Koruma Bülteni*, 29 (1-2): 47-64 [In Turkish]
- Çobanoğlu, S. 1989b. Some phytoseiid mite, species (Acarina; Phytoseiidae) determined in citrus orchards in some regions of Turkey. *Türkiye Entomoloji Dergisi*, 13 (3): 163-178. [In Turkish]
- Çobanoğlu, S. 1989c. Three new predatory mite species (Acari, Phytoseiidae) for Turkey. *Türkiye Entomoloji Dergisi*, 13 (4): 229-238. [In Turkish]
- Çobanoğlu, S. 1992 [1991-1992]. An annotated list of mites on hazel of Turkey. *Israel Journal of Entomology*, 25: 35-40.
- Çobanoğlu, S. 1993a. Systematic studies on the Phytoseiidae (Acarina) species, found in the apple growing areas of Turkey I. *Türkiye Entomoloji Dergisi*, 17 (1): 41-45. [In Turkish]

- Çobanoğlu, S. 1993b. Systematic studies on the Phytoseiidae (Acarina) species, found in the apple growing areas of Turkey II. Türkiye Entomoloji Dergisi, 17 (2): 99-116. [In Turkish]
- Çobanoğlu, S. 1993c. Systematic studies on the Phytoseiidae (Acarina) species, found in the apple growing areas of Turkey III. Türkiye Entomoloji Dergisi, 17 (3): 145-192. [In Turkish]
- Çobanoğlu, S. 1993d. Systematic studies on the Phytoseiidae (Acarina) species, found in the apple growing areas of Turkey IV. Türkiye Entomoloji Dergisi, 17 (4): 239-255. [In Turkish]
- Çobanoğlu, S. 2004. Phytoseiid mites (Mesostigmata: Phytoseiidae) of Thrace, Turkey. Israel Journal of Entomology, 34: 83-107.
- Çobanoğlu, S. and Kazmierski, A. 1999. Tydeidae and Stigmeidae (Acari, Prostigmata) from orchards, trees and shrubs in Turkey. Biological Bulletin of Poznan, 36 (1): 71-82.
- Çobanoğlu, S. and Kumral, N.A. 2016. The biodiversity, density and population trend of mites (Acari) on *Cap-sicum annuum* L. in temperate and semi-arid zones of Turkey. Systematic and Applied Acarology, 21 (2): 907-918.  
doi: 10.11158/saa.21.7.5
- Çobanoğlu, S. and Güldalı, B. 2017. Plant parasitic and predatory mites (Acari: Tetranychidae, Phytoseiidae) and population density fluctuation of two-spotted spider mite (*Tetranychus urticae* Koch) on strawberry in the Mersin province of Turkey. Journal of Zoological Sciences, 5 (2): 57-67.
- Çobanoğlu, S., Akçakoyunluoğlu, K. and Çalmaşur, Ö. 2020. Mite diversity (Acari) from ornamental plants in Erzurum in Turkey. Journal of Agricultural Sciences, 26 (2): 236-245.  
doi: 10.15832/ankutbd.518260
- Demite, P. R., de Moraes, G. J., McMurtry, J. A., Denmark, H. A. and Castilho, R.C. 2017. Phytoseiidae Database. Available [www.lea.esalq.usp.br/phytoseiidae](http://www.lea.esalq.usp.br/phytoseiidae) (Last accessed: 13 September 2021).
- Denmark, H.A., Welbourn, W.C., Fasulo, T.R. 2018. Southern red mite, *Oligonychus ilicis* (McGregor). Available <https://edis.ifas.ufl.edu/publication/IN680> (Last accessed: 13 September 2021).
- Döker, I., Stathakis, T.I. and Kazak, C. 2014a. First record of *Amblyseius bryophilus* Karg (Acari: Phytoseiidae) for the Turkish fauna. Turkish Journal of Zoology, 38 (3): 375-377.  
doi: 10.3906/tar-1301-69
- Döker, I., Witters, J., Pijnakker, J., Kazak, C., Tixier, M.S. and Kreiter, S. 2014b. *Euseius gallicus* Kreiter and Tixier (Acari: Phytoseiidae) is present in four more countries in Europe: Belgium, Germany, the Netherlands and Turkey. Acarologia, 54 (3): 245-248.  
doi: 10.1051/acarologia/20142132
- Döker, I., Kazak, C. and Karut, K. 2016. Contributions to the Phytoseiidae (Acari: Mesostigmata) fauna of Turkey: morphological variations, twelve new records, re-description of some species and a revised key to the Turkish species. Systematic and Applied Acarology, 21 (4): 505-527.  
doi: 10.11158/saa.21.4.10
- Döker, I., Kazak, C. and Karut, K. 2020. The genus *Amblyseius* Berlese (Acari: Phytoseiidae) in Turkey with discussion on the identity of *Amblyseius meridionalis*. Systematic and Applied Acarology, 25 (8): 1395-1420.  
doi: 10.11158/saa.25.8.4
- Dönel, G. and Doğan, S. 2013. The first record of a predator mite in Kelkit Valley: *Zetzellia mali* (Ewing) (Acari: Stigmeidae). Erzincan Üniversitesi Fen Bilimleri Enstitüsü Dergisi, 6 (2): 157-163. [In Turkish]
- Düzgüneş, Z. 1952. Türkiye' de turunçgil akarları. Bitki Koruma Bülteni, 1 (1): 6-11. [In Turkish]
- Düzgüneş, Z. 1963. Türkiye'de yeni bulunan akarlar. Bitki Koruma Bülteni, 3 (4): 237-246. [In Turkish]
- Elma, F. and Alaoğlu, Ö. 2008. The harmful mite species and their natural enemies on trees and shrubs in recreation areas of Konya province. Türkiye Entomoloji Dergisi, 32 (2): 115-129. [In Turkish]
- Erdoğan, H. 2013. Studies on mite species of stone fruits in Tokat province. Ms Dissertation. Graduate School of Natural Sciences, Gaziosmanpaşa University, Tokat, Turkey, 99 pp. [In Turkish]
- Erdoğan, H. and Yanar, D. 2015. Studies on mite (Acari) species of apricot (*Prunus avium* L.) in Tokat Province. Tarım Bilimleri Araştırma Dergisi, 8 (1): 71-75. [In Turkish]
- Erdoğan, T. and Cobanoğlu, S. 2020. Diversity and distribution of phytophagous and predatory mites on rosehip (*Rosa canina* L.) (Rosaceae) in Ankara, Turkey. Acarological Studies, 2 (2): 83-87.  
doi: 10.47121/acarolstud.769238
- Ersin, F., Kaptan, S., Erten, L., Kokturk, H., Gumusay, B., Denizhan, E. and Cakmak, I. 2020. Mite diversity and population dynamics of eriophyid mites on olive trees in Western Turkey. Türkiye Entomoloji Dergisi, 44 (1): 123-132.  
doi: 10.16970/entoted.649116
- Ertop, S. 2006. The determination of the species of beneficial and harmful insect and mite species in cherry orchards in Çanakkale province. Ms Dissertation. Institute of Natural Sciences, Çanakkale Onsekiz Mart University, Çanakkale, Turkey, 72 pp. [In Turkish]



- Fain, A. 1972. Notes on Saprogllyphidae hypopi (Acarina: Sarcoptiformes). II. Genera redefined. *Acarologia*, 14 (2): 225-249. [In France]
- Fain, A. and Rack, G. 1987. *Allocalvolia habrocytus* gen. n., sp. n. (Acari, Winterschmidtidae) a new hypopus phoretic on *Habrocytus elevatus* (Walker, 1834) (Hymenoptera, Pteromalidae) in Austria. *Entomologische Mitteilungen aus dem Zoologischen Staatsinstitut und Zoologischen Museum Hamburg*, 8: 309-341.
- Fan, Q.-H. and Zhang, Z.-Q. 2005. Raphignathoidea (Acari: Prostigmata). *Fauna of New Zealand, Manaaki Whenua Press, Lincoln, Canterbury, New Zealand*, 400 pp.
- Fan, Q.-H., Flechtmann, C.H.W. and De Moraes, G.J. 2016. Annotated catalogue of Stigmaeidae (Acari: Prostigmata), with a pictorial key to genera. *Zootaxa*, 4176: 1-199.  
doi: [10.11646/zootaxa.4176.1.1](https://doi.org/10.11646/zootaxa.4176.1.1)
- Faraji, F., Hajizadeh, J., Ueckermann, E.A., Kamali, K. and McMurtry, J.A. 2007. Two new records for Iranian phytoseiid mites with synonymy and keys to the species of *Typhloseiulus* Chant and McMurtry and Phytoseiidae in Iran (Acari: Mesostigmata). *International Journal of Acarology*, 33 (3): 231-239.  
doi: [10.1080/01647950708684527](https://doi.org/10.1080/01647950708684527)
- Faraji, F., Çobanoğlu, S. and Çakmak, I., 2011. A checklist and a key for the Phytoseiidae species of Turkey with two new species records (Acari: Mesostigmata). *International Journal of Acarology*, 37 (1): 221-243.  
doi: [10.1080/01647954.2011.558851](https://doi.org/10.1080/01647954.2011.558851)
- Gençer-Gökçe, P. 2015. Determination of mite species of ornamental plants in green areas of Tekirdağ. Ms Dissertation. Graduate School of Natural and Applied Sciences, Namık Kemal University, Tekirdağ, Turkey, 61 pp. [In Turkish]
- Gerson, U., Smiley, R.L. and Ochoa, R., 2003. *Mites (Acari) for pest control*. Blackwell Publishing, Oxford, UK, 539 pp.  
doi: [10.1002/9780470750995](https://doi.org/10.1002/9780470750995)
- Gonzalez-Rodriguez, R.H. 1963. Four new mites of the genus *Agistemus* Summers, 1960 (Acarina: Stigmaeidae). *Acarologia*, 5 (3): 342-350.
- Gonzalez-Rodriguez, R.H. 1965. A taxonomic study of the genera *Mediolata*, *Zetzellia* and *Agistemus* (Acarina: Stigmaeidae). *University of California Publications in Entomology*, 41: 1-64.
- Göven, M.A., Çobanoğlu, S. and Güven, B. 2009. Predatory mite fauna in Aegean vineyards. *Bitki Koruma Bülteni*, 49 (1): 1-10. [In Turkish]
- Gupta, S.K. and Sanyal, A.K. 2004. Some new records of mites (Acari) from Bangladesh. *Records of the Zoological Survey of India*, 102 (3-4): 17-24.
- Güven, B. 2008. Investigations on the injurious mites, their natural enemies and population densities in peach orchards of Izmir province. PhD Dissertation. Graduate School of Natural and Applied Sciences, Ege University, İzmir, Turkey, 121 pp. [In Turkish]
- Hale, F.A. 2007. Southern red mite (*Oligonychus ilicis*). Available <https://www.forestryimages.org/browse/detail.cfm?imgnum=5204075> (Last accessed: 13 September 2021).
- İnak, E. and Çobanoğlu, S. 2018. Determination of mite species on vineyards of Ankara, Turkey. *Fresenius Environmental Bulletin*, 27 (2): 1232-1239.
- İnal, B. 2005. Faunistic studies on the Acarina species found on various crops in Bafra and Çarşamba Plains. Ms Dissertation. Graduate School of Natural and Applied Sciences, Ondokuz Mayıs University, Samsun, Turkey, 100 pp. [In Turkish]
- İncekulak, R. and Ecevit, O. 2002. A research on determination of harmful and beneficial mite species in apple orchards in Amasya and their population densities. *Türkiye 5. Biyolojik Mücadele Kongresi*, 4-7 September 2002, Erzurum, Turkey, 297-314. [In Turkish]
- Kain, D.P. and Nyrop, J.P. 1995. *Predatory mites. Insect Identification, Sheet No. 23*. Cornell Cooperative Extension, Cornell University, Ithaca and New York State IPM Program, New York, USA.
- Karg, W. 1970. Neue arten der raubmilbenfamilie Phytoseiidae Berlese, 1916 (Acarina: Parasitiformes). *Deutsche Entomologische Zeitschrift*, 17 (4-5): 289-301. [In German]
- Kasap İ. and Çobanoğlu, S. 2007. Mite (Acari) fauna in apple orchards of around The Lake Van basin of Turkey. *Türkiye Entomoloji Dergisi*, 31 (2): 97-109.
- Kasap, İ., Atlıhan, R., Özgökçe, M.S., Kaydan, M.B., Polat, E., and Yarımbatman, A. 2008. Harmful mite species and their predators in the walnut orchards around Van Lake. *Yüzüncü Yıl Üniversitesi, Ziraat Fakültesi Tarım Bilimleri Dergisi*, 18 (2): 99-102. [In Turkish]
- Kasap, I., Çobanoğlu, S., Pehlivan, S. 2013. Predatory mite species on pome fruit trees and weeds in the province of Çanakkale and Balıkesir. *Türkiye Biyolojik Mücadele Dergisi*, 4 (2): 109-23. [In Turkish]
- Kasap, İ., Polat, B. and Kök, Ş. 2014. The important pest and predatory mites species (Acari) and their population fluctuation in the vineyards of Çanakkale Province. *Türkiye Entomoloji Dergisi*, 38 (4): 451-458. [In Turkish]  
doi: [10.16970/ted.67149](https://doi.org/10.16970/ted.67149)
- Keskin, M. 2019. Determination of harmful and predatory mite species on stone fruit trees in Tekirdağ province, Turkey. Ms Dissertation. Graduate School of Natural

- and Applied Sciences, Namık Kemal University, Tekirdağ, Turkey, 108 pp. [In Turkish]
- Khanjani, M. and Ueckermann, E.A. 2002. The stigmatid mites of Iran (Acari: Stigmatidae). *International Journal of Acarology*, 28 (4): 317-339.  
doi: [10.1080/01647950208684309](https://doi.org/10.1080/01647950208684309)
- Kolaylı, S., Küçük, M., Duran, C., Candan, F. and Dinçer, B. 2003. Chemical and antioxidant properties of *Laurocerasus officinalis* Roem (Cherry laurel) fruit grown in the Blacksea Region. *Journal of Agricultural and Food Chemistry*, 51 (25): 7489-7494.  
doi: [10.1021/jf0344486](https://doi.org/10.1021/jf0344486)
- Krantz, G.W. and Walter, D.E. 2009. A manual of acarology. Third edition. Texas Tech University Press, Lubbock, Texas, USA, 807 pp.
- Kreiter, S., Amiri, K., Douin, M., Bohinc, T., Trdan, S. and Tixier, M.S. 2020. Phytoseiid mites of Slovenia (Acari: Mesostigmata): new records and first description of the male of *Amblyseius microorientalis*. *Acarologia*, 60 (2): 203-242.  
doi: [10.24349/acarologia/20204364](https://doi.org/10.24349/acarologia/20204364)
- Kumral, N.A. and Kovancı, B. 2007. The diversity and abundance of mites in agrochemical free and conventional deciduous fruit orchards of Bursa, Turkey. *Türkiye Entomoloji Dergisi*, 31 (2): 83-95.
- Kumral, N.A. and Çobanoğlu, S. 2015a. A reservoir weed for mites: *Datura stramonium* L. (Solanaceae) in the vicinity of cultivated solanaceous plants in Turkey. *International Journal of Acarology*, 41 (7): 563-573.  
doi: [10.1080/01647954.2015.1084043](https://doi.org/10.1080/01647954.2015.1084043)
- Kumral, N.A. and Çobanoğlu, S. 2015b. The potential of the nightshade plants (Solanaceae) as reservoir plants for pest and predatory mites. *Türkiye Entomoloji Dergisi*, 39 (1): 91-108. [In Turkish]  
doi: [10.16970/ted.55042](https://doi.org/10.16970/ted.55042)
- Kutlu, S. 2016. Determination of phytophagous and predatory mite species on vegetable areas in Edirne province. Ms Dissertation, Graduate School of Natural and Applied Sciences, Namık Kemal University, Tekirdağ, Turkey, 93 pp. [In Turkish]
- Madanlar, N. 1991. Studies on the identification of Acarina species and the population densities associated with citrus plantations in Izmir. PhD Dissertation. Graduate School of Natural and Applied Science, Ege University, Izmir, Turkey, 258 pp. [In Turkish]
- McMurtry, J.A. 1977. Some predaceous mites (Phytoseiidae) on citrus in the Mediterranean region. *Entomophaga*, 22 (1): 19-30.  
doi: [10.1007/BF02372986](https://doi.org/10.1007/BF02372986)
- McMurtry, J.A., De Moraes, G.J. and Sourasso, N.F. 2013. Revision of the lifestyles of phytoseiid mites (Acari: Phytoseiidae) and implications for biological control strategies. *Systematic and Applied Acarology*, 18 (4): 297-320.  
doi: [10.11158/saa.18.4.1](https://doi.org/10.11158/saa.18.4.1)
- Meyer, M.K.P. (Smith) 1987. African Tetranychidae (Acari: Prostigmata) with reference to the world genera. *Entomology Memoir*. Department of Agriculture and Water Supply. Republic of South Africa, 69: 1-175.
- Migeon, A., Nougier, E. and Dorkeld, F. 2011. Spider mites web: A comprehensive database for the Tetranychidae. In: *Trends in Acarology*. Sabelis, M.W. and Bruin, J. (Eds). Springer, Dordrecht, Netherlands, 557-560.  
doi: [10.1007/978-90-481-9837-5\\_96](https://doi.org/10.1007/978-90-481-9837-5_96)
- Milan, S.P.A. 1984. The Macdonald Encyclopedia of medicinal plants; Macdonald: London, U.K. 252 pp.
- Moser, J.C. and Bogenschütz, H. 1984. A key to the mites associated with flying *Ips typographus* in South Germany. *Zeitschrift für angewandte Entomologie*, 97 (5): 437-450.  
doi: [10.1111/j.1439-0418.1984.tb03774.x](https://doi.org/10.1111/j.1439-0418.1984.tb03774.x)
- Muma, M.H. and Denmark, H.A. 1970. Phytoseiidae of Florida: arthropods of Florida and neighboring land areas. Florida Department of Agriculture, Division of Plant Industries, Florida, USA, 155 pp.
- Navajas, M., Gutierrez, J., Lagnel, J. and Boursot, P. 1996. Mitochondrial cytochrome oxidase I in tetranychid mites: a comparison between molecular phylogeny and changes of morphological and life history traits. *Bulletin of Entomological Research* 86 (4): 407-417.  
doi: [10.1017/S0007485300034994](https://doi.org/10.1017/S0007485300034994)
- Özman, S.K. and Çobanoğlu, S. 2001. Current status of hazelnut mites in Turkey. Proc. V. Int. Congress. on Hazelnut. Ed. S.A. Mehlenbacher. *Acta Horticulturae*, 556: 479-488.  
doi: [10.17660/ActaHortic.2001.556.70](https://doi.org/10.17660/ActaHortic.2001.556.70)
- Özman-Sullivan, S.K., Kazmierski, A. and Çobanoğlu, S. 2005. Alycina and Eupodina mites of hazelnut orchards in Turkey. VI. International Hazelnut Congress, 14-18 June 2004, Tarragona, Spain, *Acta Horticulturae*, 686: 401-406.  
doi: [10.17660/ActaHortic.2005.686.55](https://doi.org/10.17660/ActaHortic.2005.686.55)
- Özsayın, N. 2012. Studies on mite species of pome fruits in Kelkit Valley (Giresun, Sivas). Ms Dissertation. Graduate School of Natural Sciences, Gaziosmanpaşa University, Tokat, Turkey, 100 pp. [In Turkish]
- Özşişli, T. and Çobanoğlu, S. 2011. Mite (Acari) fauna of some cultivated plants from Kahramanmaraş, Turkey. *African Journal of Biotechnology*, 10 (11): 2149-55.
- Panou, H.N. and Emmanouel, N.G. 1996. Two new species of *Lorryia* (Acari: Prostigmata) from Greece. *Mitteilungen aus dem Zoologischen Museum (Hamburg)*, 12 (154): 91-103.

- Pritchard, A.E. and Baker, E.W. 1955. A revision of the spider mites family Tetranychidae, Pacific Coast Entomological Society, California, USA, 472 pp.  
doi: [10.5962/bhl.title.150852](https://doi.org/10.5962/bhl.title.150852)
- Rahmani, H., Kamali, K. and Faraji, F. 2010. Predatory mite fauna of Phytoseiidae of Northwest Iran (Acari: Mesostigmata). Turkish Journal of Zoology, 34 (4): 497-508.
- Rattan, R.S. and Sharma, A. 2011. Plant secondary metabolites in the sustainable diamondback moth (*Plutella xylostella* L.) management. Indian Journal of Fundamental and Applied Life Sciences, 1 (3): 295-309.
- Ripka, G., Fain, A., Kazmierski, A., Kreiter, S. and Magowski, W.L. 2002. Recent data to the knowledge of the arboreal mite fauna in Hungary (Acari: Mesostigmata, Prostigmata and Astigmata). Acarologia, 42 (3): 271-281.
- Ripka, G., Laniecka, I. and Kazmierski, A. 2013. On the arboreal acarofauna of Hungary: Some new and rare species of prostigmatic mites (Acari: Prostigmata: Tydeidae, Iolinidae and Stigmaeidae). Zootaxa, 3702 (1): 1-50.  
doi: [10.11646/zootaxa.3702.1.1](https://doi.org/10.11646/zootaxa.3702.1.1)
- Saccaggi, D.L. and Ueckermann E.A. 2018. *Agistemus collyerae* (Acari: Trombidiformes: Stigmaeidae) in South Africa: first record, introduction pathways and a re-description including additional life stages. Acarologia, 58 (1): 116-130.  
doi: [10.24349/acarologia/20184235](https://doi.org/10.24349/acarologia/20184235)
- Sadeghi, H., Laniecka, I. and Kazmierski, A. 2012. Tydeoid mites (Acari: Triophtydeidae, Iolinidae, Tydeidae) of Razavi Khorasan province, Iran, with description of three new species. Annales Zoologici, 62 (1): 99-114.  
doi: [10.3161/000345412X633685](https://doi.org/10.3161/000345412X633685)
- Satar, S., Ada, M., Kasap, İ. and Çobanoğlu, S. 2013. Acarina fauna of citrus trees in eastern Mediterranean Region of Turkey. IOBC-WPRS Bulletin, 95: 171-178.
- Schruff, G. 1972. Das vorkommen von milben aus der familie Tydeidae (Acari) and reben. VI. Beitrag über Untersuchungen zur Faunistik und Biologie der Milben an Kulturreben (*Vitis* sp.). Zeitschrift Für Angewandte Entomologie, 71 (2): 124-133. [In German]  
doi: [10.1111/j.1439-0418.1972.tb01729.x](https://doi.org/10.1111/j.1439-0418.1972.tb01729.x)
- Seeman, O.D. and Beard, J.J. 2011. Identification of exotic pest and Australian native and naturalised species of *Tetranychus* (Acari: Tetranychidae). Zootaxa, 2961 (1): 1-72.  
doi: [10.11646/zootaxa.2961.1.1](https://doi.org/10.11646/zootaxa.2961.1.1)
- Soysal, M. and Akyazı, R. 2018. Mite species of the vegetable crops in Ordu province with first report of *Amblyseius rademacheri* Dosse, 1958 (Mesostigmata: Phytoseiidae) in Turkey. Türkiye Entomoloji Dergisi, 42 (4): 265-286.  
doi: [10.16970/entoted.447218](https://doi.org/10.16970/entoted.447218)
- Stojnic, B., Panou, H., Papadoulis, G., Petanovic, R. and Emmanouel, N. 2002. The present knowledge and new records of phytoseiid and tydeid mites (Acari: Phytoseiidae, Tydeidae) for the fauna of Serbia and Montenegro. Acta Entomologica Serbica, 7 (1-2): 111-117.
- Sulusoglu, M. and Cavusoglu, A. 2010. Vegetative propagation of cherry laurel (*Prunus laurocerasus* L.) using semi-hardwood cuttings. African Journal of Agricultural Research, 5 (23): 3196-3202.
- Tajmiri, P., Sarihi, S., Mottaghinia, L. and Ebadollahi, A. 2014. Diversity and abundance of phytoseiid mites (Mesostigmata: Phytoseiidae) on plum orchards (*Prunus domestica* L.), raspberry hedgerows (*Rubus* spp.) and orchard floor vegetation in Guilan province, Iran. III. Integrated Pest Management Conference (IPMC), 21-22 January, 2014, Kerman, Iran, p. 458.
- Tempfli, B., Penzes, B., Fail, J. and Szabo, A. 2015. The occurrence of tydeoid mites (Acari: Tydeoidea) in Hungarian vineyards. Systematic and Applied Acarology, 20 (8): 937-954.  
doi: [10.11158/saa.20.8.9](https://doi.org/10.11158/saa.20.8.9)
- Tixier M.S., Kreiter S., Okassa M. and Cheval, B. 2009. A new species of the genus *Euseius* Wainstein (Acari: Phytoseiidae) from France. Journal of Natural History, 44 (3-4): 241-254.  
doi: [10.1080/00222930903383529](https://doi.org/10.1080/00222930903383529)
- Ueckermann, E.A. 2013. Course on taksonomy of the Tydeoidea. III. Workshop in Taxonomic Acarology, 09-10 July, 2013, Bursa, Tukey, 24 pp.
- Ueckermann, E.A. and Çobanoğlu, S. 2012. Phytophagous mites of economical importance of Turkey, Workshop in Taxonomic Acarology, 21-22 June 2012, Ankara, Turkey, 61 pp.
- Ueckermann, E.A., Cobanoğlu, S. and Ogreten, A. 2019. Re-description of two new tydeid records (Acari: Trombidiformes) with a key to Tydeoidea species of Turkey. Systematic and Applied Acarology, 24 (3): 497-507.  
doi: [10.11158/saa.24.3.13](https://doi.org/10.11158/saa.24.3.13)
- Ulusoy, M.R., Vatansever, G. and Uygun, N. 1999. The cherry pests, their natural enemies and observations on some important species in Ulukışla (Niğde) and Pozantı (Adana) province of Turkey. Türkiye Entomoloji Dergisi, 23 (2): 111-120. [In Turkish]
- Witters, J., De Bondt, G., Desamblanx, J. and Casteels, H. 2007. Acarological diagnostic research at the diagnostic centre for plants during the period 2004-2006. Communications in Agricultural and Applied Biological Sciences, 72 (3): 459-63.
- Yanar, D. and Ecevit, O. 2005. Plant injurious and predatory mite species in apple (*Malus communis* L.). Ondokuz Mayıs Üniversitesi Ziraat Fakültesi Dergisi, 20 (1): 18-23. [In Turkish]

Yeşilayer, A. and Çobanoğlu, S. 2011. The distribution of predatory mite species (Acari: Phytoseiidae) on ornamental plants and parks of Istanbul, Turkey. *Türkiye Entomoloji Dergisi*, 1 (3): 135-43.

Yeşilayer, A. and Çobanoğlu, S. 2013. Determination of Raphignathoid mites (Acari: Prostigmata: Raphignathoidea) ornamental plants of Istanbul (Turkey). *Türkiye Entomoloji Dergisi*, 37 (1): 93-103.

Zhang, Z.-Q. 2003. Mites of greenhouses identification, biology and control. CABI Publishing, Wallingford, Oxfordshire, UK and Cambridge, MA, USA, 244 pp.  
doi: [10.1079/9780851995908.0000](https://doi.org/10.1079/9780851995908.0000)

Zhang, Z.-Q., Henderson, R., Flynn, A. and Martin, N.A. 2002. Key to Tetranychidae of New Zealand. Landcare Research Contract Report: LC0102/144, Prepared for: MAF Science Policy, Project FMA180, 62 pp.

Edited by: İbrahim Çakmak

Reviewed by: Two anonymous referees

**Citation:** Akyazı, R., Soysal, M. and Altunç, Y.E. 2022. Species complexes of leaf-inhabiting mites on *Prunus laurocerasus* L. (Rosaceae) trees in Ordu, Turkey. *Acarological Studies*, 4 (1): 9-20.