International Journal of Agriculture, Environment and Food Sciences
e-ISSN : 2618-5946
www.jaefs.com
JAEFS
edit PUBLISHING

Research Article
Int J Agric Environ Food Sci 6 (3): 442-450 (2022)

Detection of thrips (Thysanoptera) species in vineyards in Tarsus and Mut districts of Mersin Province, Türkiye

Ekrem Atakan[1,*] **İbrahim Teke**[2]

[1]Plant Protection Department, Faculty of Agriculture, University of Çukurova, Adana, Türkiye
[2]Republic of Türkiye Ministry of Agrıculture and Forestry, Oil Seed Research Institute, Osmaniye, Türkiye

[*]CorrespondingAauthor: eatakan@mail.cu.edu.tr

Citation
Atakan, E., Teke, I. (2022). Detection of thrips (Thysanoptera) species in vineyards in Tarsus and Mut districts of Mersin Province, Türkiye. International Journal of Agriculture, Environment and Food Sciences, 6 (3), 442-450
Doi: https://doi.org/10.31015/jaefs.2022.3.14

Received: 03 June 2022
Accepted: 24 July 2022
Published Online: 15 August 2022
Revised: 16 August 2022

Year: 2022
Volume: 6
Issue: 3 (September)
Pages: 442-450

Available online
http://www.jaefs.com
https://dergipark.org.tr/jaefs

Abstract
Some thrips (Thysanoptera) species are seriously harmful in vineyard production areas. Tarsus and Mut locations of Mersin Province located at the southeastern Mediterranean region of Türkiye has an important place in the grape production of Türkiye. It is not known whether there are harmful thrips species in the vineyards in these locations. For this aim, thrips were collected in 2019 by tapping the different plant parts of vines. A total of 14 species were identified. Harmful thrips species such as *Drepanothrips reuteri* (Uzel), *Rubiothrips vitis* (Priesner) (Thysanoptera: Thripidae), and predatory thrips species such as *Aeolothrips collaris* Priesnier, 1919 (Thysanoptera: Aeolothripidae) and *Haplothrips globiceps* Bagnall, 1934 (Thysanoptera: Phlaeothripidae) in the vineyards in the region were also recorded for the first time. Both adults and larvae of *R. vitis* were collected relatively in high numbers during the fruiting period of the vineyards sampled.

Keywords
Mersin Province, Thysanoptera, Türkiye, Vineyards

Introduction
Thrips are a well-known insect group belonging to the order Thysanoptera. They are soft-bodied and slindirical body shapes, and they have different feeding behavior. While some thrips species are important pests in agricultural crops, some are predators and feed on soft-bodied insects and mites, including also thrips. There are 5,500 known species in the order Thysanoptera. Türkiye's Thysanoptera fauna has been studied and some species have been recorded as pests in vineyard production areas. Thrips have a piercing-sucking mouth structure and they feed on different organs of the vines, causing silvery scar tissue, especially in vine fruits. In Türkiye, different Thysanoptera species, and their damage status and patterns in the vineyards production areas have been reported (Günaydın, 1972; İren, 1972; Cengiz, 1974; Maçan, 1984; Kaplan and Çınar, 1998; Altındişli et al., 2002; Doğanlar and Yiğit, 2002; Özsemerci, 2007; Kaplan et al., 2016). Thrips species composition may vary from country to country, even in different geographical regions in the same country, and there may be differences in the economic importance of the species associated with vines. There is no study yet on the composition of Thysanoptera in vines in Mersin Province having important vineyard areas in Türkiye. In this study, it was aimed to determine the Thysanoptera species in the vineyards of Tarsus and Mut districts located at Mersin Province and to obtain basic information about the composition of pest and predatory thrips species.

Materials and Methods
Collection of thrips
In the vineyard areas of Mut and Tarsus districts of Mersin Province in 2019, non-periodic exits surveys to

determine Thysanoptera species inhabiting vines Mut and Tarsus districts of Mersin Province, Türkiye, targeting the different plant parts such as shoots, flowers, and un-matured and matured fruits of grapes were made in the vineyards in the period of spring-fall. A total of 55 surveys were carried out in the vineyards. In order to collect thrips individuals, 30 samples of randomly selected shoots, flowers, and fruits in each vineyard were tapped onto the white container with 34 × 23 × 7 cm for 5-10 sec. The extracted thrips individuals were collected with the help of a brush or suction tube, and they were stored in the plastic eppendorf (2 cc) tubes including 60% ethyl alcohol. The label information of the thrips samples such as the place of collection, date, GPS coordinates, and phenology of the plants were recorded**.**

Identifications of thrips

The collected thrips samples were brought to the laboratory. Thrips specimens were kept in AGA solution for two days in the dark in order to soften the tissues before making the preparations. Thrips individuals were kept on the hot plate at 45 degrees for approximately 45 minutes in 10% sodium hydroxide medium. The samples were taken into the petri dishes containing 96% alcohol, and the body contents were emptied with the help of a fine-tipped needle (macerations). The samples were washed in the absolute alcohol for several times and then taken to Hoyer medium and their slides were done. The identifications of the adult specimens were done by the first author by use of the keys (Priesner, 1951; Nakahara, 1994; zur Strassen, 2003; Masumoto and Okajima, 2006; Vierbergen et al., 2010).

Results and Discussion

As a result of the survey studies carried out in Tarsus and Mut districts of Mersin province in 2019, a total of 14 species, 1 from the Aeolothripidae family of the Thysanoptera order, 12 from the Thripidae family and 1 from the Phlaeothripidae family, were identified (Figure 1).

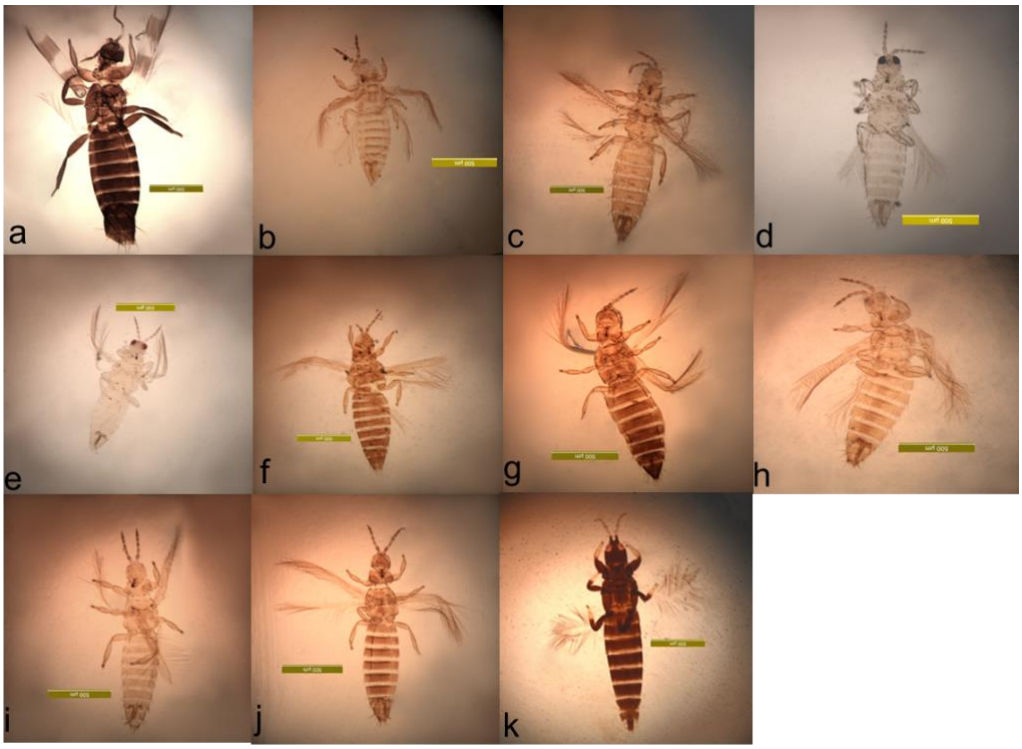

Figure 1. Some identified Thysanoptera species collected from the vineyards in Mersin Province, Türkiye in 2019; a: *Aeolothrips collaris*, b: *Drepanothrips reuteri*, c: *Frankliniella occidentalis*, d: *Mycterothrips tschirkunae*, e: *Rubiothrips vitis*, f: *Thrips euphorbiae*, g: *Thrips major*, h: *Thrips physapus*, i: *Thrips pillichi*, j: *Thrips tabaci*, k: *Haplothrips globiceps*.

Aeolothripidae

There are also phytophagous species, most of which are predators in this family. Its wings are broad and black with white bands. As a result of the study, *Aeolothrips collaris* (Priesner) was determined and information about this species is given below.

***Aeolothrips collaris* Priesner, 1919**

Synonymous: *perclarus* Melis, 1933; *brevicinctus* Bagnall, 1934; *fulvicollis* Bagnall, 1919; *meridionalis* Priesner, 1948.

Diagnosis: Antennae have 8 segments and the third segment is yellow. Males and females have bands on their wings. (Figure 1a) (Blunck, 1958).

Distribution in the world: This predatory species spreads over Germany, Azores, Albania, Bangladesh, Bulgaria, China, France, India (Lodos, 1993), Croatia, Iran (Mirab-Balou et al., 2011; Minaei, 2013), Italy, Spain, Canary Islands, Cyprus. , Corsica, Macedonia, Egypt, Mongolia (Mirab-Balou et al, 2011), Central Asia, Portugal, Russia, Sardinia, Sicily, Transcaucasia, Türkiye, Ukraine, Jordan and Greece.

Distribution in Türkiye: This species is found in Adana (Atakan and Tunç, 2004; Öztürk and Atakan, 2008; Atakan, 2009; Sayan, 2010; Atakan, 2011; Tunç et al., 2012), Afyon (Altınayar, 1981; Tunç et al. , 2012), Ankara (Altınyar, 1981; Tunç and Strassen, 1984; Tunç et al.,

2012); Antalya (Tunç, 1989; Tunç, 1990; Tunç, 1991; Tunç et al., 2012); Burdur (Tunç et al., 2012), Balıkesir (Çinkul, 2019), Isparta (Altınayar, 1981; Tunç et al., 2012), İzmir (Kılıç and Yoldaş, 2004; Tezcan et al., 2010; Şahin, 2012; Tunç et al., 2012; Güven, 2013), Konya (Altınayar, 1981; Tunç et al., 2012), Kütahya (Altınayar, 1981; Tunç et al., 2012), Manisa (Özsemerci, 2007; Tunç et al., 2012), Mardin (Kaplan et al., 2016), Mersin (Atakan, 2008; Öztürk and Atakan, 2008 ; Tunç et al., 2012), Muğla (Tunç et al., 2012), Yozgat (Tunç et al., 2012).

Host plants: *Vitis vinifera* L, *Acroclinium* sp., *Ajuga* sp., *Anclusa* sp., *Anchusa* sp., *Centaurea orientalis* L, *Cynanchum acutum*, *Chenopodium* sp., *Cynanchum acutum* L., *Daucus carota* L., *Eruca* sp., *Helianthus annuus*, *Isatis* sp., *Lamium* sp., *Linaria* sp., *Medicago sativa* L., *Mentha* sp., *Myosotis* sp., *Muscari* sp., *Narcissus* sp., *Onobrychis* sp.,*Panicum* sp., *Ranunculus* sp., *Scabiosa* sp., *Solanum* sp., *Trigonella* sp., *Vitex agnus-castus* L. (Priesner 1964; Özsemerci, 2007).

Material examined: Mut, Bağcağız, 1♀, June 28, 2019; Mut, Güllük, 2♀, July 23, 2019; Tarsus, Ulaş, 1♀, June 27, 2019.

Thripidae

Most of the harmful thrips species in plants are in this family. Their length is 1.5-2.5 mm, antennae have 6-9 segments. Antennas have a single or double sensorium (sensory organ).

As a result of the study, *Drepanothrips reuteri* (Uzel), *Frankliniella occidentalis* (Pergande), *Mycterothrips tschirkunae* (Jachontov), *Neohydatothrips* sp., *Rubiothrips vitis* (Priesner), *Thrips euphorbiae* (Knechtel), *Thrips hawaiiensis* (Priesner), *Thrips physapus* (Linnaeus), *Thrips pillichi* (Priesner) and *Thrips tabaci* (Lindeman) were identified, and information about these speciesare is given below.

***Drepanothrips reuteri* Uzel, 1895**

Synonymous: *Drepanothrips viticola* Mokrzecki, 1901; *Thrips betulicola* Reuter, 1901.

Diagnosis: Both male and female are fully winged, body, antennae and legs are light brown (Figure 1b). The antenna has 6 segments and the sense organ in the 3rd and 4th segments is bifurcated (Cengiz, 1974).

Distribution in the world: England (Mound et al., 1976), Iran, Sweden, Norway (zur Strassen, 2003) and Türkiye.

Distribution in Türkiye: İzmir (Cengiz, 1974), Manisa (Cengiz, 1974; Özsemerci, 2007).

Host plants: *Vitis vinifera* (Cengiz, 1974; Özsemerci, 2007).

Material examined: Tarsus, Sucular, 1♀, June 9, 2019; Mut, Çukurbağ, 1♀, June 11, 2019; Mut, Karşıyaka, 2♀, June 19, 2019: Mut, Deveci, 2♀, June 21, 2019; Mut, Bağcağız, 2♀, July 11, 2019; Mut, Doğancı, 2♀, July 22, 2019; Mut, Yalnızcabağ, 2♀, July 30, 2019; Mut, Hacıahmetli, 13♀, August 1, 2019; Mut, Bağcağız, 2♀, September 28, 2019; Tarsus, Sucular, 1♀, 29.09.2019; Mut, Bağcağız, 1♀, October 1, 2019.

***Frankliniella occidentalis* (Pergande, 1895)**

Synonymous: *claripennis* Morgan, 1925; *californica* Moulton, 1911; *chrysanthemi* Kurosawa, 1941; *conspicua* Moulton, 1935; *canadensis* Morgan, 1925; *dahliae* Moulton, 1948 *dianthi* Moulton, 1948;*nubila* Treherne, 1924; *syringae* Moulton, 1948; *trehernei* Morgan, 1925; *umbrosa* Moulton, 1948; *venusta* Moulton, 1935.

Diagnosis The length of the males is about 1 mm; Males are smaller than females and are around 1.4 mm in length (Figure 1c). The number of antenna segments is 8. Their color varies from pale yellow to brown depending on the season. The body of female individuals varies from light brown to orange yellowish. Antenna segments are brown, wing color is transparent white (Anonymous, 2015).

Distribution in the world: Austria, Germany, Bulgaria, Britain, Czech Republic, China (Mirab-Balou et al., 2011), Denmark, France, Crete Island, Netherlands, Iran (Mirab-Balou and Chen, 2011; Minaei, 2013), Italy, Spain, Switzerland, Canary Islands, Cyprus, Korea (Lee et al., 2001), Lithuania, Macedonia, Hungary, Norway, Portugal, Romania, Slovenia, Sicily Island, Türkiye.

Distribution in Türkiye: Adana (Atakan and Tunç, 2004; Nas et al., 2007; Atakan, 2008; 2009, 2011; Öztürk and Atakan, 2008; Hazır et al., 2011; Tunç et al., 2012), Adıyaman (Aydın and Doğanlar, 2009; Tunç et al., 2012), Balıkesir (Çinkul, 2019), Burdur (Tunç et al., 2012) , Bursa (Tunç and Hastenpflug-Vesmanis, 2016), Denizli (Maya, 2016), Hatay (Nas et al., 2007), İzmir (Kılıç and Yoldaş 2004), Manisa (Özsemerci et al., 2006), Mersin (Nas et al., 2007; Atakan, 2008; Öztürk and Atakan, 2008), Osmaniye (Nas et al., 2007), Şanlıurfa (Tunç et al., 2012).

Host plants: *Chrysanthemum indicum* (Linnaeus, 1753) (Atakan, 2011), *Chrysanthemum sinense* (Linnaeus, 1753), *Helianthus annuus* (Linnaeus, 1753), *Taraxacum officinale* (Raspudic et al., 2009), *Brassica oleracea* (Linnaeus, 1753) (Raspudic et al., 2009), *Cardaria* sp. (Linnaeus, 1753) (Tunç et al., 2012), *Calla palustris* (Linnaeus, 1753) (Raspudic et al., 2009), *Cerastium banaticum* (Heuffel, 1828) (Tunç et al., 2012), *Stellaria media* (Villars, 1786) (Raspudic et al., 2009), *Cucumis sativus* (Linnaeus, 1753) (Kılıç and Yoldaş, 2004), *Galega officinalis* (Linnaeus, 1753) (Raspudic et al., 2009), *Medicago sativa* (Linnaeus, 1753) (Atakan and Tunç, 2004), *Pelargonium peltatum* (Aiton, 1789) (Raspudic et al., 2009), *Salvia splendens* (Schultes, 1822) (Atakan, 2011), *Epilobium hirsutum* (Linnaeus, 1753) (Raspudic et al., 2009), *Eriobotrya japonica* (Lindley, 1820) (Atakan, 2009), *Fragaria* sp. (Linnaeus, 1753) (Atakan, 2008), *Prunus armeniaca* (Blanco,1845) (Öztürk and Atakan, 2008), *Rosa* sp. (Linnaeus, 1753) (Raspudic et al., 2009), *P. avium* (Şahin and Tezcan, 2014; Uzun et al., 2015), *Citrus* sp. (Linnaeus, 1753) (Nas et al., 2007), *Capsicum annuum* (Linnaeus, 1753) (Raspudic et al., 2009), *Solanum lycopersicum* (Linnaeus, 1753), *Solanum melongena* (Linnaeus, 1753) (Raspudic et al., 2009) and *Vitis* sp. (Özsemerci, 2007)

Material examined: Tarsus, Ulaş, 6♀-2♂, May 11, 2019; Tarsus, Ulaş , 5♀-4♂, July 2, 2019; Mut, Hacıahmetli , 1♀, July 18, 2019; Mut, Hacıahmetli , 1♀, July 25, 2019; Mut, Bağcağız, 1♀, August 31, 2019; Mut, Cumhuriyet, 1♂, September 25, 2019; Mut, Bağcağız, 1♀, October 01, 2019; Mut, Pınarbaşı, 1♀, October 2, 2019; Mut, Doğancı, 1♀, October 06, 2019.

***Mycterothrips tschirkunae* (Jachontov, 1961)**

Synonymous: *Rhopalandrothrips tschirkunae* Yakhontov, 1961.

Diagnosis: Adults are small and pale in colour. Body is yellowish white, and wings are pale (Figure 1d). The third and fourth antennal segments are slightly protruding, and the fifth segment is 1.4 times longer than the third and fourth antennal segments (Figure 1d) (Tunç and zur Strassen, 1984).

Distribution in the world: Middle East, Iran and Türkiye.

Distribution in Türkiye: Manisa (Özsemerci, 2007).

Host plants: *Malus communis, Peganum harmala, Trifolium montanum, Vitis vinifera* (Özsemerci, 2007).

Material examined: Mut, Hacıahmetli, 1♀, May 27, 2019; Mut, Pınarbaşı, 3♀, June 1, 2019; Mut, Bağcağız, 3♀, June 11, 2019; Mut, Hacıahmetli, 1♀, June 11, 2019; Mut, İbrahimli, 1♀, June 11, 2019; Mut Hacıahmetli, 1♂, June 19, 2019; Mut, Bağcağız, 6♀, June 28, 2019; Mut, Bağcağız, 2♀, July 4, 2019; Mut, Hacıahmetli, 12♀-3♂, July 4, 2019; Mut, Cumhuriyet, 20♀, Julky 7, 2019; Mut, Sarıkavak, 2♀, July 10, .2019; Mut, Bağcağız, 2♀-2♂, July 11, 2019; Mut, Hacıahmetli, 7♀-6♂, July 11, 2019; Mut, Yatırtaş, 13♀-1♂, July 16, 2019; Mut, Bağcağız, 1♀-9♂, July 18, 2019; Mut, Doğancı, 1♀, July 22, 2019; Mut, Güllük, 20♀-1♂, July 23, 2019; Mut, Cumhuriyet, 1♀, July 23, 2019; Mut, Hacıahmetli, 3♀, July 25, 2019; Mut, Toptanbağ, 1♀, July 30, 2019; Mut, Bağcağız, 4♀-2♂, August 1, 2019; Mut, Hacıahmetli, 7♀, August 1, 2019; Mut, İlice, 1♀, August 1, 2019; Tarsus, Sucular, 1♀, August 28, 2019; Mut, Hacıahmetli, 7♀, August 22, 2019; Tarsus, Ulaş, 1♀, September 1, 2019; Mut, Hacıahmetli, 2♀, September 8, 2019; Mut, Bağcağız, 1♀, September 19, 2019; Mut, Cumhuriyet, 1♀, September 25, 2019; Mut, Cumhuriyet, 1♀, September 27, 2019; Mut, Güllük, 2♀, October 1, 2019; Mut, Cumhuriyet, 2♀, October 1, 2019; Mut, Cumhuriyet, 2♀, October 7, 2019; Mut, Bağcağız, 1♀, October 8, 2019; Mut, Güllük, 6♀, October 9, 2019; Mut, Güllük, 6♀, October 10, 2019; Mut, Güllük, 1♀, October 15, 2019.

***Neohydatothrips* sp.**

Material examined: Mut, Güllük, 2♀, July 23, 2019.

***Rubiothrips vitis* (Priesner, 1933)**

Diagnosis: The adult female is 0.9-1.0 mm long, and it has a light yellow color (Figure 1e). Antennae with 8 segments. Ocelli are orange in colour (Blunck, 1958).

Distribution in the world: Iran, Israel**,** Romenia (zur Strassen, 2003; Majid et al., 2011) and Türkiye.

Distribution in Türkiye: Antalya, Aydın, İzmir, Manisa (Özsemerci, 2007; Tunç et al., 2012), Mardin (Kaplan et al., 2016).

Host plants: *Vitis vinifera* L. (Özsemerci, 2007; Majid et al., 2011; Kaplan et al., 2016)

Examined material: Mut, Kravga, 3♀-1♂, May 28, 2019; Mut, Pınarbaşı., 1♀, June 1, 2019; Tarsus, Ulaş ., 3♀, June 2, 2019; Tarsus, Kalburcu., 1♀, June 9, .2019; Tarsus, Sucular, 1♀-1♂, June 9, 2019; Mut, İbrahimli, 2♀, June 11, 2019; Mut, Meydan, 1♀, June 19, 2019; Mut, Bağcağız, 9♀-1♂, June 21, 2019; Tarsus, Sucular, 1♀, June 22, 2019; Mut, Hacıahmetli, 16♀, June 25, 2019; Mut, Bağcağız, 6♀, June 28, .2019; Mut, Hacıahmetli ., 1♀, July 4, 2019; Mut, Bağcağız, 9♀- 1♂, July 4, 2019; Mut, Cumhuriyet, 11♀, July 7, 2019; Tarsus, Kalburcu, 20♀, July 10, 2019; Tarsus, Sucular, 11♀, July 10, 2019; Mut, Sarıkavak, 1♀, July 10, 2019; Mut, Yatırtaş, 7♀, July 16, 2019; Mut, Deveci., 2♀-1♂, July 16, 2019; Mut, Hacıahmetli, 13♀, July 18,2019 ; Mut, Doğancı, 11♀, July 22, 2019; Mut, Güllük, 33♀, July 23, 2019; Mut, Bağcağız, 2♀- 1♂, July 25, 2019; Mut, Hacıahmetli, 18♀, July 25, 2019; Tarsus, Ulaş, 19♀, July 27, 2019; Mut, Bağcağız, 3♀, August 1, 2019; Mut, Hacıahmetli, 4♀, August 3, 2019; Tarsus, Ulaş ., 6♀-1♂, August 3, 2019; Mut, Hacıahmetli, 6♀, August 8, 2019; Mut, Bağcağız, 3♀, August 8, 2019; Mut, Cumhuriyet ., 6♀, August 10, 2019: Mut İlice., 6♀, August 18, 2019; Mut, Bağcağız, 7♀-1♂, August 15, 2019; Mut, Hacıahmetli, 3♀-1♂, August 15, 2019; Tarsus, Sucular, 5♀, August 18, 2019; Mut, Bağcağız, 5♀, August 22, 2019; Mut, Hacıahmetli ., 4♀, August 22, 2019; Mut, Cumhuriyet, 5♀, August 27, 2019; Mut, Bağcağız, 7♀, August 31, 2019; Tarsus, Ulaş, 2♀, September 1, 2019; Mut, Yalnızcabağ, 1 ♀, September 4, 2019; Mut, Hacıahmetli, 2♀, September 8, 2019; Mut, Bağcağız, 11♀, September 8, 2019; Mut, Güllük, 5♀, September 12, 2019; Tarsus, Ulaş, 2♀, September 14, 2019; Mut, Bağcağız, 10♀, September 15, 2019; Mut, Hacıahmetli, 13♀-1♂, September 15, 2019; Mut, Çukurbağ, 1♀, September 19, 2019; Mut, Hacıahmetli, 4♀, September 21, 2019; Mut, Cumhuriyet, 3♀, September 25, 2019; Mut, Cumhuriyet., 8♀, September 25, 2019; Mut, Güllük ., 8♀, September 26, 2019; Mut, Cumhuriyet, 8♀, September 27, 2019; Tarsus, Sucular, 2♀, September 29, 2019; Mut, Yatırtaş, 9♀, September 30, 2019; Mut, Güllük, 7♀-1♂, September 30, 2019; Mut, Güllük, 4♀, October 1, 2019; Mut, Cumhuriyet, 7♀, October 1, 2019; Mut, Pınarbaşı, 6♀, October 2, 2019; Mut, Hacıahmetli, 1♀, October 3, 2019; Mut, Doğancı, 14♀, October 6, 2019 ; Mut, Cumhuriyet, 11♀, October 6, 2019; Mut, Cumhuriyet, 3♀, October 7, 2019; Mut, Güllük, 5♀, October 9, 2019; Mut, Güllük, 8♀, October 10, 2019; Mut, Hacıahmetli, 1♀, October 10, 2019; Mut, Güllük, 8♀, October 15, 2019.

***Thrips euphorbiae* Knechtel, 1923**

Synonymous: *Thrips uzelianus* Priesner, 1926.

Diagnosis: The antenna has 7 segments. The body length is 1450 microns, and its body color is dark brown and the wings are light brown in females (Figure 1f) (zur Strassen, 2003).

Distribution in the world: Germany, Bulgaria, Czech Republic, Georgia, Iran, Hungary, Romania and Türkiye (zur Strassen, 2003).

Distribution in Türkiye: Hatay (Aydın, 2010).

Host plants: *Euphorbia* sp. (Aydın, 2010).

Material examined: Tarsus, Kalburcu, 2♀, June 9, 2019.

***Thrips hawaiiensis* (Morgan, 1913)**

Synonymous: *Euthrips hawaiiensis* Morgan, 1913.

Diagnosis: Adult females are about 1.3 mm, its thorax is dark orange, other body parts are pale yellowish (Figure 1g). Antennas have 7 or 8 segments. Adult males are smaller than females (Atakan et al., 2015).

Distribution in the world: Australia, Angola, China, Indonesia, Philippines, Florida, Guam, Georgia, South Carolina, India, Jamaica, Japan, California, Malaysia, Mozambique, Mexico City, Nigeria, Singapore, Sri Lanka, Sierra Leone, Taiwan, Texas, Vietnam, Uganda , Washington and New Guinea, (CABI, 1983; Sakimura, 1986; Nakahara, 1994), France (Reynaud et al., 2008), Spain (Goldaranzena, 2011), and Türkiye.

Distribution in Türkiye: It was detected in citrus orchards in Mersin (Atakan et al., 2015)

Host plants: This pest thrips was detected on *Helianthus annuus*, *Capsicum annuum*, *Solanum lycopersicum*, *Phaseolus vulgaris*, *Cucumis sativus*, *Cucurbita pepo*, *Rubus caesius*, *Citrus lemon*, *Zea mays*, *Punica granatum*, *Prunus persica nucipersica*, *Solanum melongena*, *Gossypium hirsutum*, *Glycine max*, *Pelorganium hybrid* and *Rosa* sp. in Türkiye (Atakan et al., 2015)

Material examanined: Mut, Hacıahmetli, 2♀, July 4, 2019.

***Thrips major* Uzel, 1895**

Synonymous: *gracilicornis* Uzel, 1895; *banaticus* Priesner, 1927; *inaequalis* Bagnall, 1928; *phytolaccae* Priesner, 1951; *ponticus* zur Strassen, 1970; *permutatus* zur Strassen, 1971.

Diagnosis: Body color of female varies, mainly brown (Figure 1g). Males are smaller than females. Both male and female are fully winged. Antennas have 7 segments. It is a polyphagous pest (zur Strassen, 2003)

Distribution in the world: Germany, Albania, Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Island of Crete (Greece), Croatia, Netherlands, England, Ireland, Spain, Sweden, Switzerland, Italy, Cyprus, Island of Corsica (France) , North Africa, Latvia, Lithuania, Luxembourg, Hungary, Madeira Archipelago (Portugal), Macedonia, Norway, Poland, Portugal, Romania, Russia, Sardinia (Italy), Sicily (Italy), Slovakia, Slovenia, Ukraine, Greece (Kirk and Terry, 2003) and found in Türkiye.

Distribution in Türkiye: Adana (Atakan and Tunç, 2004; Nas et al., 2007; Atakan, 2008; Öztürk and Atakan, 2008; Atakan, 2009; Tunç et al., 2012), Afyonkarahisar (Tunç et al., 2012), Ankara (Tunç and Strassen, 1984; Tunç et al., 2012), Aydın (Tunç et al., 2012), Bartın (Tunç and Hastenpflug-Vesmanis, 2016), Burdur (Tunç et al., 2012), Bursa (Tunç and Hastenpflug-Vesmanis, 2016), Denizli (Tunç et al., 2012), Hatay (Nas et al., 2007), İzmir (Tunç et al., 2012), Konya (Tunç et al., 2012), Manisa (Özsemerci et al., 2006; Tunç et al., 2012); Mersin (Nas et al., 2007; Öztürk and Atakan, 2008), Muğla (Tunç et al., 2012), Osmaniye (Nas et al., 2007) and Sakarya (Tunç and Hastenpflug-Vesmanis, 2016).

Host plants: It is a polyphagous species. *Malus domestica* (Çinkul, 2019), *Prunus dulcis* (Tunç and Hastenpflug-Vesmanis, 2016).

Material examined: Mut, Sarıkavak, 2♀, July 10, 2019.

***Thrips meridionalis* (Priesner, 1926)**

Diagnosis: Adult females are 1.8 mm long and their antennaes have 8 segments. Body, antennae and tarsi are yellowish brown in color. Metanotum has two sensilla (Blunck, 1958).

Distribution in the world: Albania, Bulgaria, Czech Republic, France, Palestine (Nickle, 2008), Crete Island, Iraq (Hamodi and Abdul-Rassoul, 2009), Iran (Nickle, 2008; Minaei, 2013), Spain, Italy, Cyprus, Lebanon (Nickle, 2008), Macedonia, Moldova, Romania, Russia, Sardinia Island (Italy) Slovenia, Ukraine, Greece, Türkiye.

Distribution in Türkiye: Adana (Atakan and Tunç, 2004; Nas et al., 2007; Öztürk and Atakan, 2008; Atakan, 2009; Hazır et al., 2011; Tunç et al., 2012), Afyonkarahisar (Tunç et al., 2012), Ankara (Altınayar, 1981; Nas et al., 2007; Tunç et al., 2012), Antalya (Tunç, 1992; Tekşam and Tunç, 2007) ; Tunç et al., 2012), Aydın (Tunç et al., 2012), Burdur (Tunç et al., 2012), Denizli (Tunç et al., 2012; Maya, 2016), Eskişehir (Tunç et al., 2012), Hatay (Nas et al., 2007), Isparta (Tunç et al., 2012), İzmir (Cengiz, 1974; Kılıç and Yoldaş, 2012; Tunç et al.,2012; Şahin and Tezcan, 2014), Kahramanmaraş (Nas et al., 2007), Konya (Tunç et al., 2012), Manisa (Cengiz, 1974; Özsemerci et al., 2006; Tunç et al., 2012), Mardin (Kaplan et al., 2016), Mersin (Nas et al., 2007; Öztürk and Atakan, 2008; Hazır et al., 2011), Muğla (Tunç et al., 2012) and Osmaniye (Nas et al., 2007).

Host plants: *Viburnum opulus* (Linnaeus, 1753), *Capsella bursa-pastoris* (Medikus, 1792), *Cardaria* sp., *Descurainia sophia* (Prantl, 1891), *Eruca* sp., *Berberis* sp., *Lonicera* sp. (Linnaeus, 1753), *Cerastium banaticum*, *Euphorbia* sp. (Linnaeus, 1753), *Medicago sativa*, *Castanea dentata* (Borkhausen, 1800), *Quercus* sp., *Jasminum* sp. (Linnaeus, 1753), *S. vulgaris*, *Secale cereale* (Linnaeus, 1753) *A. communis*, *Crataegus* sp., *Cydonia vulgaris* (Persoon, 1807), *Myrtus communis*, *Pyrus elaeagnifolia* (Tunç et al., 2012). It is also reported that it was collected from *Pyrus avium* (Şahin and Tezcan, 2014; Uzun et al., 2015).

Material examined: Mut, Sarıkavak, 2♀, July 10, 2019.

***Thrips physapus* Linnaeus, 1758**

Synonymous: *Thrips fusca* Müller, 1776; *Thrips flavicornis* Reuter, 1879; *Thrips physapus var. adusta* Uzel, 1895; *Thrips physapus f. annulata* Karny, 1907; *Thrips obscuricornis* Priesmer, 1920; *Thrips physapus var. flavescens* Priesner, 1921; *Thrips physapus var. quadrisetosus* Knechtel, 1923.

Diagnosis: Body and legs of females are brown, head yellow (Figure 1h). The first and second segments of the antennas are dark brown, the sixth and seventh segments are light brown, the third and fifth segments are yellow, and the anterior wing is light brown. The antennas have seven segments, and the sensory organs in the third and fourth segments are forked (Blunck, 1958).

Distribution in the world: England (Mound et al., 1976), Europe, Iran, Mongolia, Morocco (zur Strassen, 2003), and Türkiye.

Distribution in Türkiye: İzmir and Manisa (Cengiz, 1974).

Host plants: *Vitis vinifera* (Cengiz, 1974).

Material examined: Mut, Çukurbağ, 2♀, July 11, 2019.

***Thrips pillichi* Priesner, 1924**

Synonymous: *Thrips fallaciosa* Priesner, 1924; *Thrips hiemalis* Priesner, 1927; *Thrips kerschneri* Priesner, 1927.

Diagnosis: The body and legs of females are light brown, the third, fourth and fifth antennal segments are yellow (Figure 1i). The antennas have 7 segments. The sense organs in the third and fourth segments are forked. There are 3 setae in the distal half of the anterior vein of the anterior wing, and approximately 14 setae in rows in the posterior vein (Franz and Priesner, 1961).

Distribution in the world: England (Mound et al., 1976), Iran (zur Strassen, 2003) and Türkiye.

Distribution in Türkiye: Adana (Pehlivan, 2019).

Host plants: *Achillea*, *Chrysanthenum segetum*, *Senecio vernalis*

Material examined: Mut, Cumhuriyet, 1♀, July 7, 2019.

***Thrips tabaci* Lindeman, 1889**

Synonymous: *solanacearum* Portchinski, 1883; *communis* Uzel, 1895; *bicolar* Karny, 1907; *bremnerii* Moulton, 1907; *uzeli* Karny, 1907; *hololeucus* Bagnall, 1914; *adamsoni* Bagnall, 1923; *debilis* Bagnall, 1923; *frankeniae* Bagnall, 1926; *seminiveus* Girault, 1926; *dorsalis* Bagnall, 1927; *shakespearei* Girault, 1929; *indigenus* Girault, 1929; *dianthi* Moulton, 1936; *kallarensis* Ananthakrishnan, 1960.

Diagnosis: Females are 1 mm long and have colors from yellow to brown (Figure 1j). Antennae with 7 segments. Wing edges are fringed in the form of cilias (Blunck, 1958).

Distribution in the world: Germany, Austria, Albania, Britain, Bulgaria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Crete Island (Greece), Croatia, Netherlands, Iraq (Hamodi and AbdulRassoul, 2009), Iran (Minaei, 2013), Ireland , Spain, Sweden, Switzerland, Italy, Iceland, Canary Islands, Korea (Lee et al., 2001), Latvia, Lithuania, Hungary, Macedonia, Island of Malta, Norway, Poland, Portugal, Romania, Russia, Sardinia Island, Sicily Island , Slovakia, Slovenia, Ukraine, Greece, Türkiye.

Distribution in Türkiye: Adana (Atakan and Tunç, 2004; Atakan and Uygur, 2004; Nas et al., 2007; Atakan, 2008, 2009, 2011; Öztürk and Atakan, 2008; Tunç et al., 2012), Adapazarı (Tunç et al., 2012; Tunç and Hastenpflug-Vesmanis, 2016), Adıyaman (Aydın and Doğanlar, 2009; Tunç et al., 2012), Afyonkarahisar (Tunç et al., 2012), Amasya (Tunç et al., 2012), Ankara (Tunç et al., 2012; Tunç and Hastenpflug-Vesmanis, 2016), Antalya (Tunç et al. , 2012), Aydın (Akşit et al., 2003; Tunç et al. 2012), Balıkesir (Tunç et al., 2012; Tunç and Hastenpflug-Vesmanis, 2016), Bartın (Tunç and Hastenpflug-Vesmanis, 2016), Denizli (Tunç et al., 2012), Çorum (Tunç et al., 2012), Gaziantep (Aydın and Doğanlar, 2009; Tunç et al., 2012), Hatay (Nas et al., 2007; Tunç et al., 2012)), Isparta (Tunç et al., 2012; Uzun et al., 2015), Istanbul (Tunç et al., 2012; Tunç and Hastenpflug-Vesmanis, 2016), Izmir (Cengiz, 1974; Tunç et al., 2012; Şahin and Tezcan, 2014), Kahramanmaraş (Aydın and Doğanlar, 2009; Tunç et al., 2012), Konya (Tunç et al., 2012; Tunç and Hastenpflug-Vesmanis, 2016), Manisa (Cengiz , 1974; Özsemerci et al., 2006; Tunç et al., 2012), Mardin (Kaplan et al., 2016), Mersin (Atakan et al. Uygur, 2004; Nas et al., 2007; Atakan, 2008; Öztürk and Atakan, 2008; Tunç et al. 2012), Muğla (Tunç et al. ., 2012), Osmaniye (Nas et al., 2007), Şanlıurfa (Aydın and Doğanlar, 2009), Tekirdağ (Tunç et al., 2012).

Host plants: *Allium cepa* (Linnaeus, 1753), *Allium sativum* (Linnaeus, 1753), *Apium graveolens* (Linnaeus, 1753), *Brassica oleracea* (Linnaeus, 1753), *Beta vulgaris* (Linnaeus, 1753), *Cucumis sativus*, *Cucurbita pepo* (Linnaeus, 1753), *Phaseolus vulgaris* (Wallich, 1831), *Gossypium hirsutum* (Linnaeus, 1753), *P. avium* (Tunç, 1989; Şahin and Tezcan, 2014; Uzun et al., 2015), *Nicotiana tabacum* (Linnaeus, 1753) and *Solanum lycopersicum*.

Material examined: Tarsus, Ulaş, 1♀, May 11, 2019; Tarsus, Sucular, 1♀, June 2, 2019; Tarsus, Sucular, 1♀, June 9, 2019; Mut, Karşıyaka, 1♀, June 19, 2019; Mut, Bağcağız, 1♀, June 28, 2019; Mut, Cumhuriyet, 3♀, July 7, 2019; Mut, Doğancı, 1♀, July 22, 2019; Mut, Yalnızcabağ, 1♀, July 30, 2019; Mut, Hacıahmetli, 1♀, August 8, 2019; Mut, Bağcağız, 1♀, August 8, 2019; Mut, Bağcağız, 1♀, August 15, 2019; Mut, Hacıahmetli, 1♀, August 15, 2019; Mut, Hacıahmetli, 1♀, August 22, .2019; Mut, Bağcağız, 1♀, September 8, 2019; Mut, Hacıahmetli., 3♀, September 8, 2019; Tarsus, Ulaş, 1♀, September 14, 2019; Mut, Cumhuriyet, 2♀, October 1, 2019; Mut, Pınarbaşı, 1♀, October 2, 2019; Mut, Cumhuriyet, 2♀, October 6, 2019; Mut, Güllük, 2♀, October 9, 2019; Mut, Güllük ., 2♀, October 10, 2019.

Phlaeothripidae

Species in this family has large body, and its 10th abdomen segment is elongated in the form of a tube. Some of them feeds on fungi and other insects or acaries. As a result of the study, *Haplothrips globiceps* (Bagnall), which is a predatory thrips, was determined and information about this species is given below.

***Haplothrips globiceps* Bagnall, 1934**

Diagnosis: Body length is 1.1-1.4 mm, males are smaller than females. Antennas have 8 segments, the first segment is brown, and the other segments are lemon yellow in colour (Figure 1k). Abdomen brown and 11 segmented. Its wings has long cilias and are light-colored, the cilias on the front and hind wings gradually extend from the bottom to the tip, and in this form the wings resemble a pear (Bagnall, 1934).

Distribution in the world: Iran (Shiraz), (Minaei and Mound, 2008) and Türkiye.

Distribution in Türkiye: Adıyaman (Günaydın, 1972; Maçan, 1984), İzmir, Manisa (Cengiz, 1974; Özsemerci, 2007), Mardin (Maçan, 1984), Diyarbakır (Maçan, 1984), Malatya (Maçan, 1984), Elazığ (Maçan, 1984), Ankara (Tunç and Strassen, 1984), Mardin (Kaplan et al., 2016).

Host plants: *Vitis vinifera* (Cengiz, 1974; Özsemerci, 2007; Kaplan et al., 2016), *Morus alba*, *Cornus mas* (Tunç et al., 2012), *Salix* sp. (Minaei and Mound 2008).

Material examined: Mut, Hacıahmetli, 2♀, May 27, 2019; Mut, İbrahimli, 1♀, June 11, 2019; Mut, Doğancı, 5♀, June 11, 2019; Mut, Karşıyaka, 1♀, June 19, 2019; Mut, Bağcağız, 4♀, June 21, 2019; Mut, Hacıahmetli, 2♀-1♂, June 25, 2019; Mut Yatırtaş, 12♀, July 16, 2019; Mut, Doğancı, 8♀, July 22, 2019; Mut, Cumhuriyet, 7♀, July 23, 2019; Mut, Güllük, 6♀, July 23, 2019; Mut, Bağcağız ., 1♀, August 1, 2019; Mut, Hacıahmetli, 1♀, August 8, 2019; Mut, Bağcağız, 1♀, September 15, 2019; Mut, Cumhuriyet, 1♀, September 27, 2019; Mut Yatırtaş, 1♀, July 30, 2019; Mut, Pınarbaşı, 1♀, October 2, 2019; Mut, Cumhuriyet, 1♀, October 6, 2019; Tarsus, Ulaş, 1♀, October 13, 2019.

In this study, a total of 14 Thysanoptera species were identified. The number of species detected in some studies (Özsemerci, 2007; Kaplan et al., 2016) carried out in the vineyards in Türkiye, is higher. Differences in thrips species numbers are likely due to sampling frequency, size of sampling area, as well as other ecological factors (eg. related to vegetation, presence of alternative hosts of thrips sampled, and climatic factors). However, in the current study, harmful species were detected in the vineyard areas in the Eastern Mediterranean region, and thrips damage was observed on unmatured and ripe grapes sampled. Most adults and larvae of *R. vitis* were noted in the collected samples. Although a large number of

Thysanoptera species were detected in the vineyard areas in the previous studies done in Türkiye, sufficient information could not be reached about which species is primarily harmful.

Conclucions

In this study, a total of 14 thrips species were detected in the region, which is an important grape production area in the eastern Mediterranean region of Türkiye, and some Thysanoptera species, which are considered harmful in vineyards, were detected for the first time with this study. Although some species included in the Technical Instructions for Vineyard Pests in Türkiye were detected in this study (For example, *F. occidentalis* and *M. tschirkunae*), they were not commonly found. In this study, it was concluded that *R. vitis* reproduces in the critical phenological period of plants (fruiting period), and therefore, it may be harmful in vineyards in the locations. However, there is a need for more detailed studies on the economic importance of these species identified in the region.

Compliance with Ethical Standards

Conflict of interest

The authors declared that for this research article, they have no actual, potential or perceived conflict of interest.

Author contribution

IT collected thrips specimens from the vineyards. EA done microscobic slides of the thrips specimens and identified them, and EA wrote the paper. All the authors read and approved the final manuscript. All the authors verify that the Text, Figures, and Tables are original and that they have not been published before.

Ethical approval

Ethics committee approval is not required.

Funding

No financial support was received for this study.

Data availability

Not applicable.

Consent for publication

Not applicable

References

Anonymous, (2015). ‘’Zirai Mücadele Teknik Talimatları’’. Gıda Tarım ve Hayvancılık Bakanlığı, Tarımsal Araştırmalar ve Politikalar Genel Müdürlüğü, Bitki Sağlığı Araştırmaları Daire Başkanlığı, Ankara, 4: 369-372 (in Turkish)

Altınayar, G. (1981). Orta Anadolu Bölgesi tahıl tarlalarındaki böcek faunasının saptanması üzerinde çalışmalar. Bitki Koruma Bülteni, 21 (2):53-58 (in Turkish with English abstract)

Altındişli, F.Ö., Göven, M.A., Altındişli, A. (2002). Population trends of insect and their beneficials in organic and conventional vineyards in Türkiye. Proceeding of VII Th. European Congress of Entomology/Greece, p: 152.

Atakan, E. (2008). Adana ve Mersin illerinde çilekte thrips (Thysanoptera) türleri ve zararı üzerine ön araştırmalar. Türkiye Entomoloji Dergisi, 32(2):91-101 (in Turkish with English abstract). Retrieved from https://dergipark.org.tr/tr/pub/entoted

Atakan, E. (2009). Adana ve çevresinde yenidünya bahçelerinde bulunan thrips (Thysanoptera) türleriyle avcı böceklerin popülasyon değişimleri ve thrips zararı üzerine araştırmalar. Alatarım, 8(2): 1-7 (in Turkish with English abstract). Retrieved from https://arastirma.tarimorman.gov.tr/alata/Menu/34/Alatarim

Atakan, E. (2011). Adana kentinde parklardaki bazı süs bitkilerinde bulunan thrips (Thysanoptera) türleri. Alatarım, 10(2): 79-84 (in Turkish with English abstract). Doi: https://doi.org.10.16882/derim.2019.518502

Atakan, E., Tunç, İ. (2004). Adana ilinde yoncada Thysanoptera faunası ve bazı önemli türlerin ve predatör böceklerin popülasyon değişimleri. Türkiye Entomoloji Dergisi, 28(3): 181-192. https://dergipark.org.tr/tr/pub/entoted

Atakan, E., Ölçülü, M., Pehlivan, S., Satar, S. (2015). Türkiye’de yeni zararlı bir thrips türü: *Thrips hawaiiensis* (Morgan, 1913) (Thysanoptera: Thripidae). Türkiye Entomoloji Bülteni, 5:77-84. Doi: http://dx.doi.org/10.16969/

Atakan, E., Uygur S. (2004). Winter and spring abundance of *Frankliniella* spp. and *Thrips tabaci* Lindeman (Thysanoptera: Thripidae) on weed host plants in Türkiye. Journal of Applied Entomology, 129 (1):17-26. Doi: http://10.1111/j.1439-0418.2005.00918.x

Aydın, S., Doğanlar, M. (2009). Güneydoğu Anadolu Bölgesi’nde yeni bir zararlı, *Frankliniella occidentalis* (Pergande) (Thysanoptera: Thripidae). Türkiye Entomoloji Dergisi, 33(2):153-160. https://dergipark.org.tr/tr/pub/entoted

Aydın, S. (2010). Hatay ilinde çeşitli bitkiler üzerinde bulunan Thripidae (Thysanoptera) türleri, tanımları ve sistematiği üzerinde çalışmalar. Mustafa Kemal Üniversitesi, Fen Bilimleri Enstitüsü, Bitki Koruma Anabilim Dalı Yüksek Lisans Tezi, Adana, Türkiye (in Turkish).

Bagnall, R. S. (1934). Contributions towards knowledge of some European Thysanoptera Annals Magazine Natural History London, 14(10):496-497.

Blunck, H. (1958). Thysanopteren aus der Türkei (Thysanoptera). Beiträge Zur Entomologie, 8:99-111.

CABI, (1983). *Thrips hawaiiensis* (Morgan). Distribution maps of plant pest no.431. CABI, Wallingford (GB), 2pp.

Cengiz, F. (1974). İzmir ve Manisa dolaylarında bağlara arız olan Thysanoptera türleri, tanınmaları, konukçuları, zararları ve tabii düşmanları üzerinde araştırmalar. Türkiye Cumhuriyeti Tarım Bakanlığı Zirai Mücadele ve Zirai Karantina Genel Müdürlüğü Araştırma Eserleri Serisi Teknik Bülten No: 22 İstiklal Matbaası, 86s, İzmir (in Turkish).

Çinkul, K. (2019). Susurluk (Balıkesir) yöresinde meyve ağaçlarındaki thrips (Thysanoptera) türlerinin saptanması. Balıkesir Üniversitesi, Fen Bilimleri Enstitüsü Biyoloji Anabilim Dalı Yüksek Lisans Tezi, Balıkesir (in Turkish).

Doğanlar, M., Yiğit, A. (2002). Hatay'da yeni bir potansiyel meyve ve bağ zararlısı siyah bağ thripsi, *Retithrips syriacus* (Mayet) (Thysanoptera: Thripidae). Türkiye Entomoloji Dergisi, 26 (4):283-294 (in Turkish with English abstract). Retrieved from https://dergipark.org.tr/tr/pub/entoted

Franz, H., Priesner, H. (1961). Ordnung Thysanoptera. Die Nordost-Alpen im Spiegel ihrer Landtierwelt. Eine Gebietsmonographie II. Innsbruck, Austria: Universitatsverlag Wagner.

Goldaranzena, A. (2011). First record of *Thrips hawaiiensis* (Morgan, 1913) (Thysanoptera: Thripidae), an Asian pest thrips in Spain. Bulletin OEPP/EPPO, 41(2): 170-173. Doi: http://dx.doi.org/10.1111/j.1365-2338.2011.02450.x

Güven, B. (2013). İzmir ili şeftali bahçelerinde bulunan predatör böceklerin yayılışı ve bulunma oranları. Türkiye Biyolojik Mücadele Dergisi, 4 (1): 31-40 (in Turkish with English abstract). Retrieved from https://dergipark.org.tr/tr/pub/tbmd

Günaydın, T. (1972). A Survey of Vine Pests in South- East and East Anatolia. Plant Protection Research Annual, 42, p: 170.

Hamodi, A.A.F., Abdul Rassoul, M.S. (2009). New record of thrips species (Thysanoptera: Thripidae) from middle of Iraq. Bulletin of the Iraq Natural History Museum, 10 (4): 31-37.

Hazır, A., Ulusoy, M.R. , Atakan, E. (2011). Adana ve Mersin illeri nektarin bahçelerinde saptanan Thysanoptera türleri ve zarar oranı üzerine araştırmalar. Türkiye Entomoloji Dergisi, 35 (1): 133-144 (in Turkish with English abstract). Retrieved from https://dergipark.org.tr/tr/pub/entoted

İren, Z., (1972). Orta Anadolu Bölgesi'nde önemli bağ zararlılarının tespiti üzerinde araştırmalar. Zirai Mücadele Araştırma Yıllığı, 40-41 (in Turkish).

Kaplan, M., Bayhan, E., Atakan, E. (2016). Mardin İli bağ alanlarındaki Thysanoptera türleri, mevsimsel yoğunlukları ve yayılış alanlarının belirlenmesi. Türkiye Entomoloji Bülteni 2016, 6 (2):161-168 (in Turkish with English abstract). Doi: https://doi.org/10.16969/teb.03520

Kaplan, C., Çınar, M. (1998). Güneydoğu Anadolu Bölgesi bağlarında ekonomik öneme sahip zararlılar ile yararlıların yıllık popülasyon değişimleri ve zararlıların mücadeleye esas kritik biyolojik dönemlerinin saptanması. Meyve ve Bağ Zararlıları Alanında Yayınlar (Basılmamış Nihai Rapor) (in Turkish).

Kılıç, T., Yoldaş, Z. (2004). İzmir ilinde örtüaltı hıyar yetiştiriciliğinde thrips (Thysanoptera) türlerinin belirlenmesi, yayılış ve bulunuş oranları üzerinde araştırmalar.Türkiye Entomoloji Dergisi, 28 (2): 151-160 (in Turkish with English abstract). https://dergipark.org.tr/tr/pub/entoted

Kirk, W.D.J., Terry, L.L. (2003). The spread of the western flower thrips *Frankliniella occidentalis* (Pergande). Agricultural and Forest Entomology, 5 (4): 301-310. Doi: https://doi.org/10.1046/j.1461-9563.2003.00192.x

Lee, G.S., Lee, J.H., Kang, S.H., Woo, K. S. (2001). Thrips species (Thysanoptera: Thripidae) in winter season and their vernal activities on Jeju Island. Korea Journal Asia Pasific Entomology, 4(2): 115-122. Retrieved from https://www.journals.elsevier.com/journal-of-asia-pacific-entomology

Lodos, N. (1993). Türkiye Entomolojisi III Genel, Uygulamalı, Faunistik. Ege Üniversitesi Ziraat Fakültesi Yayınları No: 456, 167s (in Turkish).

Maçan, S., (1984). Güneydoğu Anadolu Bölgesi'nde bağlarda zarar yapan böcek türleri, önemlilerinin tanınmaları, yayılışları ve ekonomik önemleri üzerinde incelemeler. T.C. Tarım Orman ve Köy İşleri Bakanlığı, Zirai Mücadele Zirai Koruma Genel Müdürlüğü Diyarbakır Bölge Zirai Mücadele Araştırma Enstitüsü, Ankara, 47s (in Turkish).

Masumoto, M., Okajima, S. (2006). A revision of and key to world species of *Mycterothrips* Trybom (Thysanoptera, Thripidae). Zootaxa, 1261:1-90. Doi: https://doi.org/10.11646/zootaxa.1261.1.1

Maya, E. (2016). Honaz (Denizli)'da kiraz çiçek, yaprak ve meyvelerindeki thrips (Thysanoptera) türlerinin saptanması ve yayılış ile bulunma oranlarının belirlenmesi üzerinde araştırmalar. Ege Üniversitesi, Fen Bilimleri Enstitüsü, Bitki Koruma Anabilim Dalı, Yüksek Lisans Tezi, 99s (in Turkish).

Minaei, K., Mound, L.A. (2008). The Thysanoptera Haplothripini (Phlaeothripidae) of Iran. Journal of Natural History, 42:2617-2658. Doi: https://doi.org/10.1080/00222930802354159

Minaei, K. (2013). Thrips (Insecta: Thysanoptera) of Iran. A revised an updated checklist, Zookeys, 330: 53-74. Doi: https://doi.org/10.3897/zookeys.330.5939

Mirab- Balou, M., Cken, X. (2011). Iranian Thripinae with ctenidia laterally on the abdominal tergites (Thysanoptera: Thripidae). Natura Montenegrina, 10 (4):435-466. Retrieved from https://pmcg.co.me/natura-montenegrina/

Mound, L. A., Morison, G.D., Pitkin, B.R., Palmer, J.M. (1976). Thysanoptera. Handbooks Identification of British Insects, 1(11):1-79.

Nakahara, S., (1994). The genus Thrips Linnaeus (Thysanoptera: Thripidae) of the new world.United States Department of Agriculture Technical Bulletin, 1822:1-183.

Nas, S., Atakan, E., Elekçioğlu, N. (2007). Doğu Akdeniz Bölgesi turunçgil alanlarında bulunan Thysanoptera türleri. Türkiye Entomoloji Dergisi, 31(4):307-316 (in Turkish with English abstract). Retrieved from https://dergipark.org.tr/tr/pub/entoted

Nickle, D. A. (2008). Commonly intercepted thrips at U.S. ports of entry from Africa, Eurpe and the Mediterranean. III, the genus *Thrips* Linnaeus, 1758 (Thysanoptera: Thripidae). Proceedings Entomological Society of Washington, 110(1): 165-185.

Özsemerci, F. (2007). Manisa Ilinde çekirdeksiz üzüm bağlarında bulunan Thysanoptera türlerinin yayılışı, popülasyon değişimi ve önemli zararlı türün biyolojisi üzerinde araştırmalar. Ege Üniversitesi Fen Bilimleri Enstitüsü, Bitki Koruma Anabilim Dalı, Doktora Tezi, 121s (in Turkish).

Özsemerci, F., Akşit, T., Tunç, İ. (2006). Manisa Ili bağ alanlarında saptanan Thrips türleri ve önemli türlerin ilçelere göre dağılımı. Bitki Koruma Bülteni, 46 (1-4):51-63 (in Turkish with English abstract). Retrieved from https://dergipark.org.tr/tr/pub/bitkorb

Öztürk, N., Atakan, E. (2008). Mersin ve Adana Ili kayısı bahçelerinde bulunan thrips (Thysanoptera) türleri üzerinde araştırmalar. Alatarım, 7 (2):14-20 (in Turkish with English abstract). Retrieved from https://arastirma.tarimorman.gov.tr/alata/Menu/34/Alatarim

Pehlivan, S. (2019). Adana Ili ve çevresinde avcı *Orius* (Hemiptera: Anthocoridae) türleri, bazı yazlık sebzelerde thripslerle (Thysanoptera) birlikte popülasyon değişimleri ve *Orius vicinus* (Ribaut)'un bazı biyolojik özellikleri. Çukurova Üniversitesi Fen Bilimleri Enstitüsü, Bitki Koruma Anabilim Dalı, Doktora Tezi, 178s (in Turkish).

Priesner, H. (1951). Zwei neue Thysanopteren aus der Türkei. Zeitschrift fur Pflanzenkrankheiten und Pflanzenschutz, 58:255-258

Priesner, H. (1964). Ordnung Thysanoptera. Bestimmungsbücher zur Bodenfauna Europas. Akademie-Verlag, Berlin, 242.

Raspudic, E., Ivezic, M., Brmez, M., Trdan, S. (2009). Distribution of Thysanoptera species and their host plants in Croatia. Acta Agriculturae Slovenica, 93(3): 275-283.Doi: https://10.2478/v10014-009-0016-y

Reynaud, P., Balmes, V., Pizzol, J. (2008). *Thrips hawaiiensis* (Morgan, 1913) (Thysanoptera: Thripidae), an Asian pest thrips now established in Europe. Bulletin OEPP/ EPPO, 38(1): 155-160. Retrieved from https://www.eppo.int/RESOURCES/eppo_publications/eppo_bulletin

Sakimura, K. (1986). Thrips in around the coconut plantations in Jamaica with a few taxonomic notes (Thysanoptera). Florida Entomologist, 69(2): 348-363. Retrieved from https://journals.flvc.org/flaent

Sayan, M. (2010). Adana'daki buğday Agro-Ekosistemdeki böcek türlerinin belirlenmesi. Çukurova Üniversitesi Fen Bilimleri Enstitüsü, Bitki Koruma Anabilim Dalı, 80s (in Turkish).

Şahin, B., Tezcan, S. (2014). Investigation on thrips (Thysanoptera) species occuring flowers of cherry trees in Kemalpaşa (Izmir) province of western Türkiye. Linzer Biologische Beitrage, 46 (1): 889-893. Retrieved from https://www.researchgate.net/publication/268448325

Tezcan, S., Tezcan, F., Gülperçin, N. (2010). İzmir'den 4000 Böcek Türü. Egetan Basım Yayın Tanıtım Ltd. Şti. Alsancak İzmir, 253s.

Tunç, İ. (1989). Thrips infesting temperate fruit flowers. Akdeniz Ziraat Fakültesi Dergisi, 2 (2):133-140. Retrieved from https://dergipark.org.tr/tr/pub/akdenizfderg/issue/36288/410143

Tunç, İ. (1990). Antalya'da bulunan avcı thysanoptera türleri ve habitatları. Türkiye II. Biyolojik Mücadele Kongresi, 26-29 Eylül 1990, Ankara.

Tunç, İ. (1991). Studies on the Thysanoptera of Antalya I. Aeolothripidae Uzel. Türkiye Entomoloji Dergisi, 15(3):129-141. Retrieved from https://dergipark.org.tr/tr/pub/entoted

Tunç, İ., Bahşi, Ş.Ü., Sümbül, H. (2012). Thysanoptera fauna of the Lakes Region, Türkiye. Turkish Journal of Zoology, 36 (4):412-429. Retrieved from http://journals.tubitak.gov.tr/zoology/

Tunç, İ., Hastenpflug-Vesmanis, A. (2016). Records and checklist of Thysanoptera in Türkiye. Turkish Journal of Zoology, 40 (5):769-778. Retrieved from http://journals.tubitak.gov.tr/zoology/

Tunç İ. & zur Strassen, R. (1984). Thysanoptera of Ankara province. University of Ankara Publications of Faculty of Agriculture, 919:37p.

Uzun, A., Tezcan, S., Demirözer, O. (2015). Thrips (Thysanoptera) species occurring in cherry orchards in Isparta province of western Türkiye. Linzer Biologischen Beitrage, 47(1): 963-968. Retrieved from https://www.zobodat.at/publikation_series.php?id=2

Zur Strassen, R. (2003). Die Terebranten Thysanopteren Europas und des Mittel Gebietes. Die tierwelt deutschlauds, Beggründet 1925 von Friedrich Dahl, 74. Teil. Goecke und Evers, Keltern, p. 277, Deutschland.

Vierbergen, G., Kucharczyk, H., Kirk, W.D.J. (2010). A key to second instar larvae of the Thripidae of the Western Palaeartic region (Thysanoptera). Tijdschrift voor Entomologie, 153:99-160. Doi: https://10.1163/22119434-900000294