

Thrips (Thysanoptera) Species Found in the Flowers of Trees and Bushes in Ege University Bornova Campus, Izmir, Türkiye

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Abstract

Reduced product quality and market value are the outcomes of thrips damage, and certain thrips species can act as virus vectors, resulting in significant direct and indirect product losses. This study was carried out in April and May 2022 to investigate the thrips species belonging to the Thysanoptera order found in trees and shrubs at Ege University Bornova Campus, Izmir, Türkiye. In this study, a total of 23 species were identified, including 13 species from the Thripidae family, 3 species from each of the Aeolothripidae and Melanthripidae families, and 4 species from the Phlaeothripidae family. The distribution of these species by genera is as follows: *Frankliniella* (2), *Thrips* (10), *Taeniothrips* (1), *Aeolothrips* (3), *Haplothrips* (4), and *Melanthrips* (3).

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Ege Üniversitesi Bornova Yerleşkesi (İzmir)'ndeki Ağaç ve Ağaççıkların Çiçeklerinde Bulunan Trips (Thysanoptera) Türleri

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Öz

Trips'lerin yaptığı zarar sonucunda ürünlerin kalitesi ve buna bağlı olarak pazar değeri düşmekte, bazı trips türleri virüs vektörü olarak hareket ederek önemli doğrudan ve dolaylı ürün kayıplarına neden olabilmektedir. Bu çalışma, Ege Üniversitesi Bornova Yerleşkesi (İzmir)'ndeki ağaç ve çalılarda bulunan Thysanoptera takımına ait trips türlerini araştırmak amacıyla 2022 yılı Nisan ve Mayıs aylarında gerçekleştirilmiştir. Çalışma sonunda Thripidae familyasından 13, Aeolothripidae ve Melanthripidae familyalarından üçer tür, Phlaeothripidae familyasından dört tür olmak üzere toplam 23 tür saptanmış olup, bu türlerin cinslere göre dağılımı şu şekildedir: *Frankliniella* (2), *Thrips* (10), *Taeniothrips* (1), *Aeolothrips* (3), *Haplothrips* (4) ve *Melanthrips* (3).

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Introduction

Although the order Thysanoptera is a small morphological group in comparison to other insect groups, it is quite diverse in terms of species. Thysanoptera is an order of 6 384 species divided into 15 families and 585 genera (ThripsWiki, 2022).

Türkiye, situated in the Palearctic biogeographic region, hosts thousands of species in mountains, plateaus, and plains with varying altitudes. The microclimate effect from valleys and depressions further enriches species richness. However, studies on Thysanoptera diversity and inventory are limited. Currently, 199 Thysanoptera species have been identified in Türkiye (Tunç and Hastenpflug, 2016; Atakan and Pehlivan, 2021; Uzun et al., 2022; Tezcan, 2024; Mutlu et al., 2024). In a recent paper, *Haplothrips caespitis* Priesner, 1936 (Thysanoptera: Phlaeothripidae) which was collected from Izmir Province is a new record for the fauna of Türkiye (Çinkul et al., 2024).

This study, conducted between April and May 2022, aims to identify the Thysanoptera order species in trees and shrubs at Ege University Bornova Campus, Izmir, Türkiye as a previous study has not been conducted.

Material and Method

The study involved collecting samples from various trees and shrubs from the Thripidae, Aeolothripidae, Phlaeothripidae, and Melanthripidae families during April-May 2022 at Ege University Bornova Campus, İzmir (38.4548164° N; 27.2266330° W).

The main plant species in the sampling areas are as follows:

Rosaceae family: *Photinia serratifolia* (Desf.) Kalkman, *Pyrus communis* Linnaeus, *Cydonia oblonga* Miller, *Chanomeles japonica* (Thunb.) Lindl., *Malus domestica* (Suckow) Borkh., *Prunus domestica* Linnaeus, *Spiraea cantoniensis* Lour, *Prunus armeniaca* Linnaeus, *Prunus cerasifera* Ehrh., *Rosa canina* Linnaeus, *Prunus cerasus* Linnaeus; Nyctaginaceae family: *Bougainvillea spectabilis* Willdenow; Fabaceae family: *Bauhinia variegata* Linnaeus, *Robinia pseudoacacia* Linnaeus; Bignoniaceae family: × *Chitalpa tashkentensis* T. S. Elias & Wisura; Rutaceae family: *Citrus reticulata* Blanco, *Citrus aurantium* Linnaeus, *Citrus* sp.; Punicaceae family: *Punica granatum* Linnaeus; Paulowniaceae family: *Paulownia tomentosa* (Thunb.) Steud.; Oleaceae family: *Jasminum officinale* Linnaeus, *Olea europaea* Linnaeus; Pittosporaceae family: *Pittosporum tobira* (Thunb.) W. T. Aiton.

The study involved collecting 50 flower samples from 23 different hosts, ensuring accurate representation of the plants. The samples were then placed in paper bags, labeled with the date of collection, host, daily air temperature, and proportional humidity values, and taken to the laboratory for examination.

The specimen was placed into eppendorf tube containing preservation fluid, AGA, (10 parts 60% ethyl alcohol, 1 part glycerine, and 1 part acetic acid) (Mound and Kibby, 1998). After a preliminary inspection and identification with a stereo microscope, the collected sample was preserved in 60% ethyl alcohol. All descriptions, measurements and photos were made with an Olympus SC50 microscope. The material was identified by the second author and deposited in the collection of the Plant Protection Research Institute, Bornova, Izmir, Türkiye.

Results and Discussion

At the end of the study, a total of 23 species were identified and the findings about these species are given below.

Aeolothripidae

Aeolothrips collaris Priesner, 1919

Material examined: Bornova, Ege University Campus, 15.04.2022, *Cydonia oblonga*, (1).

Aeolothrips fasciatus (Linnaeus, 1758)

Material examined: Bornova, Ege University Campus, 25.05.2022, *Bougainvillea spectabilis*, (1).

Aeolothrips intermedius Bagnall, 1934

Material examined: Bornova, Ege University Campus, 29.04.2022, *Citrus* sp., (1).

Melanthripidae

Melanthrips fuscus Sulzer, 1776

Material examined: Bornova, Ege University Campus, *Prunus cerasus*, (1); 15.04.2022, *Cydonia oblonga*, (1).

Melanthrips knechteli Priesner, 1936

Material examined: Bornova, Ege University Campus, 23.04.2022, *Jasminum officinale*, (6).

Melanthrips rivnayi Priesner, 1936

Material examined: Bornova, Ege University Campus, 05.04.2022, *Prunus armeniaca*, (1); 06.04.2022, *Pyrus communis*, (6); 10.04.2022, *Prunus cerasus*, (1); 15.04.2022, *Cydonia oblonga*, (17); 15.04.2022, *Prunus domestica*, (5).

Thripidae

Frankliniella occidentalis (Pergande, 1895)

Material examined: Bornova, Ege University Campus, 15.04.2022, *Prunus domestica*, (1); 29.04.2022, *Paulownia tomentosa*, (1); 29.04.2022, *Robinia pseudoacacia*, (2); 29.04.2022, *Citrus* sp., (3); 06.05.2022, *Bauhinia variegata*, (2); 11.05.2022, *Olea europaea*, (5); 12.05.2022, *Pittosporum tobira*, (1); 16.05.2022, *Rosa canina*, (4); 25.05.2022, *Bougainvillea spectabilis*, (5); 25.05.2022, *Chitalpa tashkentensis*, (9).

Frankliniella intonsa (Trybom, 1895)

Material examined: Bornova, Ege University Campus, 25.05.2022, *Bougainvillea spectabilis*, (1).

Taeniothrips inconsequens (Uzel, 1895)

Material examined: Bornova, Ege University Campus, 05.04.2022, *Prunus armeniaca*, (7); 06.04.2022, *Pyrus communis*, (5); 10.04.2022, *Prunus cerasus*, (1); 15.04.2022, *Prunus domestica*, (1).

Thrips angusticeps Uzel, 1895

Material examined: Bornova, Ege University Campus, 15.04.2022, *Cydonia oblonga*, (10); 29.04.2022, *Citrus* sp., (40); 29.04.2022, *Paulownia tomentosa*, (1).

Thrips dubius Priesner, 1927

Material examined: Bornova, Ege University Campus, 05.04.2022, *Prunus armeniaca*, (1); 10.04.2022, *Chaenomeles japonica*, (1); 23.04.2022, *Jasminum officinale*, (1); 23.04.2022, *Malus domestica*, (1); 29.04.2022, *Citrus* sp., (1); 29.04.2022, *Robinia pseudoacacia*, (2).

Thrips italicus (Bagnall, 1926)

Material examined: Bornova, Ege University Campus, 29.04.2022, *Robinia pseudoacacia*, (1).

Thrips major Uzel, 1895

Material examined: Bornova, Ege University Campus, 04.04.2022, *Prunus cerasifera*, (1); 04.04.2022, *Prunus domestica*, (1); 15.04.2022, *Cydonia oblonga*, (1); 22.04.2022, *Citrus aurantium*, (3); 23.04.2022, *Malus domestica*, (28); 29.04.2022, *Citrus* sp., (3); 29.04.2022, *Paulownia tomentosa*, (3); 29.04.2022, *Photinia serrulata*, (1); 29.04.2022, *Robinia pseudoacacia*, (6); 06.05.2022, *Bauhinia variegata*, (1); 12.05.2022, *Pittosporum tobira*, (1); 16.05.2022, *Rosa canina*, (2); 25.05.2022, *Bougainvillea spectabilis*, (2).

Thrips meridionalis (Priesner 1926)

Material examined: Bornova, Ege University Campus, 15.04.2022, *Prunus domestica*, (1).

Thrips minutissimus Linnaeus, 1758

Material examined: Bornova, Ege University Campus, 29.04.2022, *Citrus* sp., (2); 06.05.2022, *Citrus reticulata*, (2).

Thrips nigropilosus Uzel, 1895

Material examined: Bornova, Ege University Campus, 23.04.2022, *Malus domestica*, (3).

Thrips simplex (Morison, 1930)

Material examined: Bornova, Ege University Campus, 15.04.2022, *Cydonia oblonga*, (1).

Thrips tabaci Lindeman, 1889

Material examined: Bornova, Ege University Campus, 10.04.2022, *Chaenomeles japonica*, (1); 10.04.2022, *Prunus cerasus*, (1); 15.04.2022, *Cydonia oblonga*, (3); 15.04.2022, *Prunus domestica*, (2); 22.04.2022, *Spiraea cantoniensis*, (1); 23.04.2022, *Jasminum officinale*, (3); 23.04.2022, *Malus domestica*, (1); 29.04.2022, *Citrus* sp., (1); 12.05.2022, *Pittosporum tobira*, (5); 16.05.2022, *Rosa canina*, (2); 25.05.2022, *Bougainvillea spectabilis*, (4); 25.05.2022, *Punica granatum*, (1).

Thrips viminalis Uzel, 1895

Material examined: Bornova, Ege University Campus, 29.04.2022, *Citrus* sp., (1).

Phlaeothripidae***Haplothrips bolacophilus*** Priesner, 1938**Material examined:** Bornova, Ege University Campus, 29.04.2022, *Paulownia tomentosa*, (1).***Haplothrips caespitis*** Priesner, 1936**Material examined:** Bornova, Ege University Campus, 19.04.2022, *Paulownia tomentosa*, (1).***Haplothrips reuteri*** (Karny, 1907)**Material examined:** Bornova, Ege University Campus, 05.04.2022, *Prunus armeniaca*, (1); 06.04.2022, *Pyrus communis*, (1); 15.04.2022, *Cydonia oblonga*, (1); 29.04.2022, *Citrus* sp., (1); 06.05.2022, *Bauhinia variegata*, (1).***Haplothrips tritici*** (Kurdjumov, 1912)**Material examined:** Bornova, Ege University Campus, 10.04.2022, *Chaenomeles japonica*, (1).

The numerical and proportional status of the mentioned above species are given in Table 1.

Table 1. The numerical and proportional status of thrips species by family

Family	Species	Number of samples	Rate (%)
Aeolothripidae	<i>Aeolothrips collaris</i>	1	0,40
Aeolothripidae	<i>Aeolothrips fasciatus</i>	1	0,40
Aeolothripidae	<i>Aeolothrips intermedius</i>	1	0,40
Melanthripidae	<i>Melanthrips fuscus</i>	2	0,82
Melanthripidae	<i>Melanthrips knechteli</i>	6	2,46
Melanthripidae	<i>Melanthrips rivnayi</i>	30	12,34
Thripidae	<i>Thrips angusticeps</i>	51	20,98
Thripidae	<i>Thrips dubius</i>	7	2,88
Thripidae	<i>Thrips italicus</i>	1	0,40
Thripidae	<i>Thrips major</i>	53	21,81
Thripidae	<i>Thrips meridionalis</i>	1	0,40
Thripidae	<i>Thrips minutissimus</i>	4	1,64
Thripidae	<i>Thrips nigropilosus</i>	3	1,23
Thripidae	<i>Thrips simplex</i>	1	0,40
Thripidae	<i>Thrips tabaci</i>	25	10,28
Thripidae	<i>Thrips viminalis</i>	1	0,40
Thripidae	<i>Taeniothrips inconsequens</i>	14	5,76
Thripidae	<i>Frankliniella occidentalis</i>	33	13,58
Thripidae	<i>Frankliniella intonsa</i>	1	0,40

Phlaeothripidae	<i>Haplothrips bolacophilus</i>	1	0,40
Phlaeothripidae	<i>Haplothrips reuteri</i>	5	2,05
Phlaeothripidae	<i>Haplothrips tritici</i>	1	0,40
Phlaeothripidae	<i>Haplothrips caespitis</i>	1	0,40
Total		244	100,00

The distribution of species according to their genera is as follows: *Frankliniella* (2), *Thrips* (10), *Taeniothrips* (1), *Aeolothrips* (3), *Haplothrips* (4) and *Melanthrips* (3).

The most common species observed are *T. major* (21,81%), *T. angusticeps* (20,98%), *F. occidentalis* (13,58%), *M. rivnayi* (12,34%), *T. tabaci* (10,28%), and *T. inconsequens* (5,76%). These six species account for 84,75% of total individuals.

The numerical and proportional status of the examined species according to the plants from which they were sampled is given in Table 2.

Table 2. The numerical status of thrips species based on plants sampled

Family	Plant species from which samples were collected	Number of thrips species	Number of thrips individuals
Bignoniaceae	<i>Chitalpa tashkentensis</i>	1	9
Fabaceae	<i>Bauhinia variegata</i>	3	4
Fabaceae	<i>Robinia pseudoacacia</i>	4	11
Lythraceae	<i>Punica granatum</i>	1	1
Nyctaginaceae	<i>Bougainvillea spectabilis</i>	5	13
Oleaceae	<i>Jasminum officinale</i>	3	10
Oleaceae	<i>Olea europaea</i>	1	5
Paulowniaceae	<i>Paulownia tomentosa</i>	5	7
Pittosporaceae	<i>Pittosporum tobira</i>	3	7
Rosaceae	<i>Chaenomeles japonica</i>	3	3
Rosaceae	<i>Cydonia oblonga</i>	8	35
Rosaceae	<i>Malus domestica</i>	4	33
Rosaceae	<i>Photinia serrulata</i>	1	1
Rosaceae	<i>Prunus armeniaca</i>	4	10
Rosaceae	<i>Prunus cerasifera</i>	1	1
Rosaceae	<i>Prunus cerasus</i>	4	4
Rosaceae	<i>Prunus domestica</i>	6	11
Rosaceae	<i>Pyrus communis</i>	3	12
Rosaceae	<i>Rosa canina</i>	3	8

Rosaceae	<i>Spiraea cantoniensis</i>	1	1
Rutaceae	<i>Citrus aurantium</i>	1	3
Rutaceae	<i>Citrus reticulata</i>	1	2
Rutaceae	<i>Citrus</i> sp.	9	53
Toplam		23	244

It is worth noting that the number and variety of thrips obtained from fruit trees are higher than those from ornamental plants in the form of shrubs. Citrus fruits host more thrips species and types than any other host plant. While 36 thrips species were detected in previous studies conducted in citrus orchards in Antalya province, eight species were detected in another study conducted in the Eastern Mediterranean Region. *T. major*, which forms populations in various plants that bloom at different times from September to May, reaches its peak during the flowering period of citrus fruits (Nas et al., 2007; Tekşam and Tunç, 2009). This study found *T. major* to be the most common species, considering the number of individuals detected.

The study determined that phytophagous species are more abundant and have more individuals than predatory species. A significant number of *Aeolothrips* species feed on flower pollen and hunt arthropods (Mound and Kibby, 1998). It is known that the species *A. collaris*, *A. fasciatus*, and *A. intermedius* identified in our study are predators of other insect species.

As a result of the research, *A. collaris* was identified on quince plants and *A. intermedius* on citrus plants. The prey of *Aeolothrips* species, known as banded thrips, are generally pests on cultivated plants. These species prey on some mites, psyllids and whitefly larvae and eggs, as well as aphids. These species are omnivorous and can complete their growth by consuming only pollen from flowers. It is known that they do not consume nutrients from leaves and stems, but instead use their mouthparts to extract water from these organs (Bournier et al., 1979; Lacasa, 1980; Trdan et al., 2005).

When the distribution of Thysanoptera species identified in stone and pome fruit trees was examined based on plant parts, it was discovered that thrips abundance was higher in flowers than in other parts. *Aeolothrips ericae*, *A. fasciatus*, *Aeolothrips gloriosus*, *A. intermedius*, *Aeolothrips priesneri*, *Aeolothrips versicolor*, *Haplothrips distinguendus*, *Haplothrips globiceps*, *Haplothrips arenarius*, *Melanthrips pallidor*, *M. rivnayı*, *M. fuscus*, *Orothrips priesneri*, *Tenothrips frici*, *Thrips australis*, *Thrips euphorbiae*, *T. major*, *Thrips mareoticus*, *T. simplex*, and *T. tabaci* were found only in flowers (Çinkul et al., 2021).

During the observations, no evidence was obtained regarding the damage caused by these species to plants. It is expected that knowledge of Thysanoptera species will increase further in the coming years as a result of studies on annual ornamental plants and other plants, particularly during the flowering season and afterward.

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