



Research on the Fruit Fly (Diptera: Tephritidae) fauna in Elazığ province (Türkiye)

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Abstract

Purpose: The aim of this study is to identify the fruit fly species (Tephritidae) collected during fieldwork conducted in Elazığ Province between 2022 and 2023, to document the fruit fly fauna of Elazığ Province, and to contribute to the determination of fruit fly diversity in Türkiye.

Method: Adult fruit fly specimens were collected from potential host plants using insect nets. The collected specimens were placed in killing bottles, transferred to storage jars, and subsequently examined and identified based on morphological characters at the Entomology Laboratory of the Department of Biology, Gaziantep University.

Findings: As a result of the study, a total of 39 species belonging to 13 genera (*Acanthiophilus*, *Campiglossa*, *Chaetorellia*, *Ensina*, *Euaresta*, *Myopites*, *Orellia*, *Sphenella*, *Tephritis*, *Tephritomyia*, *Terellia*, *Trupanea* and *Urophora*) were identified.

Conclusion: This study provides the first comprehensive faunistic survey of Tephritidae in Elazığ Province and improves our understanding of regional fruit fly diversity in Türkiye.

Keywords: Elazığ, Fauna, Fruit flies, Tephritidae, Türkiye.

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Elazığ (Türkiye) ili Meyve Sinekleri (Diptera: Tephritidae) faunası üzerine araştırmalar

Özet

Amaç: Bu çalışmanın amacı, 2022–2023 yılları arasında Elazığ ilinde gerçekleştirilen arazi çalışmaları sırasında toplanan meyve sineği (Tephritidae) türlerini belirlemek, Elazığ ilinin meyve sineği faunasını ortaya koymak ve Türkiye'deki meyve sineği çeşitliliğinin belirlenmesine katkı sağlamaktır.

Metod: Ergin meyve sineği örnekleri, potansiyel konukçu bitkiler üzerinden böcek ağı kullanılarak toplanmıştır. Toplanan örnekler öldürme şişelerine alınmış, saklama kaplarına aktarılmış ve ardından Gaziantep Üniversitesi Biyoloji Bölümü Entomoloji Laboratuvarı'nda morfolojik karakterlerine göre incelenerek teşhis edilmiştir.

Bulgular: Çalışmanın sonucunda, 13 cinse *Acanthiophilus*, *Campiglossa*, *Chaetorellia*, *Ensina*, *Euaresta*, *Myopites*, *Orellia*, *Sphenella*, *Tephritis*, *Tephritomyia*, *Terellia*, *Trupanea* ve *Urophora*) ait toplam 39 tür teşhis edilmiştir.

Sonuç: Bu çalışma, Elazığ ilinde Tephritidae familyasına yönelik gerçekleştirilen ilk kapsamlı faunistik çalışma olup, Türkiye'de meyve sineği çeşitliliğinin daha iyi anlaşılmasına katkı sağlamaktadır.

Anahtar kelimeler: Elazığ, Fauna, Meyve Sinekleri, Tephritidae, Türkiye.

1. Introduction

Fruit flies (Diptera: Tephritidae) are an economically important family of Diptera in terms of cultivated plants and have a wide distribution worldwide. The existence of 4716 species and 492 genera have been reported in the world. [1,2]. On the other hand, along with newly identified species worldwide, the number of species has continuously been increasing. In the first published checklist of Turkish fruit flies, Giray [3] documented the presence of 51 species in

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1979. Freidberg and Kütük [3] described a new species of the genus *Tephritis* Latreille, 1804 (*Tephritis merzi* Freidberg & Kütük) from Türkiye. By 2003, a total of 71 fruit fly species had been recorded in the country.

In the following years, several new species were added to the Turkish fruit fly fauna through ongoing taxonomic studies, indicating a continuous increase in species diversity. Several new species have been described, including *Myoleja korneyevi* [5], *Urophora doganlari* [6], *Tephritis erdemlii* [7], *Urophora hani* [8], *Terellia yuksele* [9], *Terellia askaleensis* [10], *Tephritis ozaslani* [11], and *Terellia freidbergi* [12]. In addition, further species have been reported as new to Türkiye, such as *Urophora turkeyensis* [13], *Heringina arezoana* [14], *Terellia akguli* [15], *Tephritis turkeri* [16], *Tephritis kutuki* [17] and *Carpomya liat* [18]. Moreover, several regional studies have contributed additional new records from different parts of the country. As a result of these cumulative efforts, the total number of fruit fly species recorded from Türkiye has reached 178.

Despite the considerable number of studies conducted on Tephritidae in Türkiye, the distribution of many species is still not well understood at the regional level. This is especially true for Eastern Anatolia, which remains relatively underexplored in terms of faunistic data.

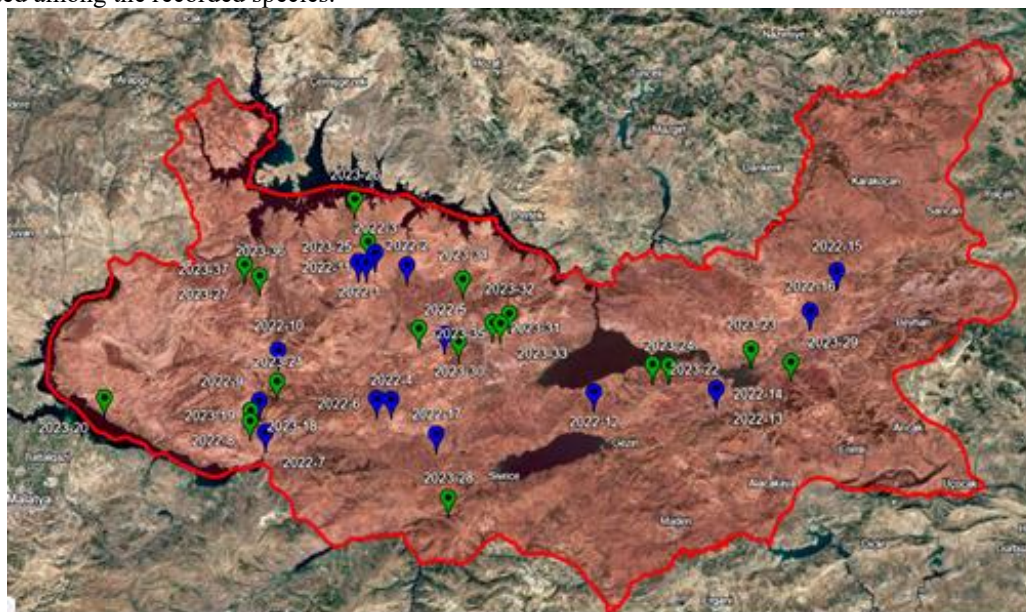
Although various studies have contributed to the knowledge of fruit flies in different parts of the country, no comprehensive faunistic research has been carried out in Elazığ Province so far. Located in Eastern Anatolia, Elazığ has diverse ecological conditions and a wide range of potential host plants, suggesting that it may support a rich Tephritidae fauna. However, due to the lack of previous studies, the species diversity and distribution patterns in this area have remained largely unknown.

In this paper, the present study was conducted to identify the Tephritidae species in Elazığ Province based on field surveys carried out between 2022 and 2023. By providing the first comprehensive faunistic dataset for the region, this study aims to contribute to a better understanding of fruit fly diversity in Türkiye.

2. Materials and methods

This study aimed to determine the fruit fly fauna of Elazığ Province, located in the Eastern Anatolia Region of Türkiye, characterized by diverse ecological conditions. Field studies were conducted at 37 different localities in Elazığ Province during 2022–2023 (Figure 1). A total of 2435 adult fruit fly specimens were collected from these sampling sites. Samples were collected from the flower heads of Asteraceae plants, which are possible host plants, using insect nets. The collected specimens were subsequently transferred into killing bottles containing ethyl acetate to immobilize them prior to further processing. The collected specimens were transported to the Entomology Museum of the Department of Biology at Gaziantep University for further processing. The specimens were dried and prepared for pinning following standard entomological procedures [19]. Species identification was carried out using diagnostic keys and species descriptions provided in the relevant literature, including Kütük [20], Yaran [21], Korneyev [22], and White and Marquardt [23].

In addition, the Shannon-Wiener diversity index and Pielou evenness index were used to provide a quantitative interpretation of species diversity and abundance distribution within the sampled Tephritidae fauna. While H' reflects overall species diversity by considering both richness and relative abundance, J' indicates how evenly individuals are distributed among the recorded species.



3. Results

A total of 39 species belonging to 13 genera within the family Tephritidae family were identified. Of these, 15 species belonging to 8 genera were assigned to the subfamily Tephritinae, while 14 species belonging to 3 genera were identified from the subfamily Terellinae. In addition, 10 species belonging to 2 genera were recorded from the subfamily Myopitinae. The examined material for each identified species is presented alphabetically in Table 1. In addition, the number of females and males, as well as the female-to-male (F/M) ratio, are provided for each species. Male count higher than female count for many species. Since males emerge from the pupal stage earlier, the observed number of males may show seasonal variation.

Table 1. Species list, count of females and males and Female/Male ratio for each species

	Species	Females	Males	Total	F/M Ratio
1	<i>Acanthiophilus helianthi</i>	229	163	392	1,40
2	<i>Campiglossa bidentis</i>	3	13	16	0,23
3	<i>Campiglossa producta</i>	3	6	9	0,50
4	<i>Chaetorellia acrolophi</i>	24	68	92	0,35
5	<i>Chaetorellia carthami</i>	1	5	6	0,20
6	<i>Chaetorellia conjuncta</i>	6	14	20	0,43
7	<i>Chaetorellia jaceae</i>	5	6	11	0,83
8	<i>Chaetorellia loricata</i>	3	8	11	0,38
9	<i>Chaetorellia succinea</i>	1	7	8	0,14
10	<i>Euaresta bullans</i>	6	17	23	0,35
11	<i>Ensina sonchi</i>	1	3	4	0,33
12	<i>Myopites apicatus</i>	2	9	11	0,22
13	<i>Orellia falcata</i>	2	2	4	1,00
14	<i>Orellia stictica</i>	2	2	4	1,00
15	<i>Sphenella marginata</i>	3	5	8	0,60
16	<i>Tephritis acanthiophilopsis</i>	2	2	4	1,00
17	<i>Tephritis divisa</i>	3	4	7	0,75
18	<i>Tephritis fallax</i>	4	1	5	4,00
19	<i>Tephritis nigricauda</i>	1	1	2	1,00
20	<i>Tephritis postica</i>	7	15	22	0,47
21	<i>Tephritis recurrens</i>	2	2	4	1,00
22	<i>Tephritomyia lauta</i>	469	547	1016	0,86
23	<i>Trupanea amoena</i>	15	13	28	1,15
24	<i>Trupanea stellata</i>	3	1	4	3,00
25	<i>Terellia gynaecochroma</i>	11	23	34	0,48
26	<i>Terellia luteola</i>	38	39	77	0,97
27	<i>Terellia nigripalpis</i>	5	10	15	0,50
28	<i>Terellia serratulae</i>	47	51	98	0,92
29	<i>Terellia uncinata</i>	5	8	13	0,63
30	<i>Terellia virens</i>	3	17	20	0,18
31	<i>Urophora affinis</i>	171	174	345	0,98
32	<i>Urophora aprica</i>	8	11	19	0,73
33	<i>Urophora cuspidata</i>	6	2	8	3,00
34	<i>Urophora jaceana</i>	5	3	8	1,67
35	<i>Urophora mauritanica</i>	4	9	13	0,44
36	<i>Urophora phalolepidis</i>	1	5	6	0,20
37	<i>Urophora quadrifasciata</i>	14	10	24	1,40
38	<i>Urophora solstitialis</i>	8	26	34	0,31
39	<i>Urophora terebrans</i>	2	8	10	0,25
	Total	1125	1310	2435	0,86

Acanthophilus helianthi (Rossi, 1794)

Material examined: Elazığ, Center, Öksüzüşağı, 38°46' N, 39°05' E, 1328 m, 10.06.2022, 9♀♀, 5♂♂; Center, Cumhuriyet, 39°06' N, 39°17' E, 1096 m, 12.06.2022, 10♀♀, 15♂♂; Center, Gülmahmut, 38°55' N, 39°04' E, 1148 m, 12.06.2022, 13♀♀, 8♂♂; Center, Çötelli, 38°46' N, 39°00' E, 1063 m, 21.07.2022, 8♀♀, 5♂♂; Kovancılar, Kuşçu, 38°48' N, 39°58' E, 1134 m, 23.07.2022, 18♀♀, 14♂♂; Kovancılar, Saraybahçe, 38°44' N, 39°55' E, 949 m, 23.07.2022, 16♀♀, 10♂♂; Baskil, Şahaplı, 38°30' N, 38°47' E, 1117 m, 18.06.2023, 15♀♀, 10♂♂; Baskil, Doğançık, 38°34' N, 38°50' E, 1346 m, 19.06.2023, 15♀♀, 8♂♂; Center, Şahsuvar, 38°38' N, 39°36' E, 932 m, 20.06.2023, 9♀♀, 8♂♂; Kovancılar, Beşpınar, 38°40' N, 39°48' E, 1060 m, 20.06.2023, 20♀♀, 15♂♂; Center, Koruköy, 38°48' N, 39°00' E, 993 m, 21.06.2023, 12♀♀, 6♂♂; Center, Muratçık, 38°52' N, 38°58' E, 898 m, 21.06.2023, 15♀♀, 9♂♂; Keban, Bahçeli, 38°45' N, 38°45' E, 1289 m, 20.06.2023, 5♀♀, 3♂♂; Sivrice, Dörtbölük, 38°24' N, 39°12' E, 1503 m, 20.07.2023, 14♀♀, 5♂♂; Palu, Üçdeğirmenler, 38°39' N, 39°53' E, 1503 m, 20.07.2023, 11♀♀, 10♂♂; Center, Center, 38°39' N, 39°12' E, 1065 m, 20.07.2023, 15♀♀, 7♂♂; Center, Sugözü, 38°41' N, 39°16' E, 1204 m, 21.07.2023, 8♀♀, 6♂♂; Center, Salkaya, 38°45' N, 39°12' E, 1090 m, 22.07.2023, 16♀♀, 7♂♂; Center, Sarıçubuk, 38°40' N, 39°07' E, 1097 m, 22.07.2023, 16♀♀, 12♂♂.

Campiglossa bidentis (Robineau-Desvoidy, 1830)

Material examined: Elazığ, Baskil, Şahaplı, 38°32' N, 38°48' E, 1098 m, 20.07.2022, 1♀, 9♂♂; Baskil, Şahaplı, 38°30' N, 38°47' E, 1117 m, 18.06.2023, 2♀♀, 3♂♂; Sivrice, Dörtbölük, 38°24' N, 39°12' E, 1503 m, 20.07.2023, 1♂♂.

Campiglossa producta (Loew, 1844)

Material examined: Elazığ, Kovancılar, Koçkale, 38°35' N, 39°29' E, 900 m, 22.07.2022, 1♂♂; Alacakaya, Sarıkamış, 38°36' N, 39°44' E, 884 m, 22.07.2022, 1♀; Center, Şahsuvar, 38°38' N, 39°38' E, 913 m, 20.06.2023, 1♂; Sivrice, Dörtbölük, 38°24' N, 39°12' E, 1503 m, 20.07.2023, 3♂♂; Center, Sugözü, 38°41' N, 39°16' E, 1204 m, 21.07.2023, 1♀; Center, Güneyçayırı, 38°42' N, 39°18' E, 1492 m, 21.07.2023, 1♀, 1♂; Center, Güneyçayırı, 38°41' N, 39°17' E, 1231 m, 22.07.2023, 1♂.

Chaetorellia acrolophi White&Marquardt, 1989

Material examined: Elazığ, Baskil, Aladikme, 38°46' N, 39°27' E, 1096 m, 10.06.2022, 1♂; Center, Öksüzüşağı, 38°46' N, 39°05' E, 1328 m, 10.06.2022, 2♂♂; Center, Gököy, 38°55' N, 39°07' E, 1164 m, 11.06.2022, 1♂; Center, Gülmahmut, 38°55' N, 39°04' E, 1148 m, 12.06.2022, 1♀, 10♂♂; Center, Çötelli, 38°46' N, 39°00' E, 1063 m, 21.07.2022, 2♀♀, 1♂; Kovancılar, Koçkale, 38°35' N, 39°29' E, 900 m, 22.07.2022, 5♀♀, 14♂♂; Alacakaya, Gümüşkaynak, 38°36' N, 39°44' E, 906 m, 22.07.2022, 1♀, 3♂♂; Alacakaya, Sarıkamış, 38°36' N, 39°44' E, 884 m, 22.07.2022, 1♂; Kovancılar, Saraybahçe, 38°44' N, 39°55' E, 949 m, 23.07.2022, 6♀♀, 9♂♂; Sivrice, Kavaktepe, 38°30' N, 39°10' E, 1062 m, 24.07.2022, 6♂♂; Center, Şahsuvar, 38°38' N, 39°36' E, 932 m, 20.06.2023, 1♀; Kovancılar, Beşpınar, 38°40' N, 39°48' E, 1060 m, 20.06.2023, 2♀♀, 1♂; Center, Koruköy, 38°48' N, 39°00' E, 993 m, 21.06.2023, 1♂; Palu, Üçdeğirmenler, 38°39' N, 39°53' E, 1503 m, 20.07.2023, 2♀♀, 3♂♂; Center, Center, 38°39' N, 39°12' E, 1065 m, 20.07.2023, 12♂♂; Center, Sugözü, 38°41' N, 39°16' E, 1204 m, 21.07.2023, 1♂; Center, Güneyçayırı, 38°41' N, 39°17' E, 1231 m, 22.07.2023, 1♀; Center, Salkaya, 38°45' N, 39°12' E, 1090 m, 22.07.2023, 1♀; Center, Sarıçubuk, 38°40' N, 39°07' E, 1097 m, 22.07.2023, 3♂♂.

Chaetorellia carthami Stackelberg, 1929

Material examined: Elazığ, Alacakaya, Sarıkamış, 38°36' N, 39°44' E, 884 m, 22.07.2022, 1♀; Kovancılar, Saraybahçe, 38°44' N, 39°55' E, 949 m, 23.07.2022, 3♂♂; Sivrice, Kavaktepe, 38°30' N, 39°10' E, 1062 m, 24.07.2022, 1♂; Sivrice, Dörtbölük, 38°24' N, 39°12' E, 1503 m, 20.07.2023, 1♂.

Chaetorellia conjuncta (Becker, 1913)

Material examined: Elazığ, Center, Gököy, 38°55' N, 39°07' E, 1164 m, 11.06.2022, 3♀♀, 8♂♂; Kovancılar, Koçkale, 38°35' N, 39°29' E, 900 m, 22.07.2022, 1♂; Kovancılar, Kuşçu, 38°48' N, 39°58' E, 1134 m, 23.07.2022, 1♂♂; Kovancılar, Saraybahçe, 38°44' N, 39°55' E, 949 m, 23.07.2022, 3♀♀, 3♂♂; Sivrice, Kavaktepe, 38°30' N, 39°10' E, 1062 m, 24.07.2022, 1♂.

Chaetorellia jaceae (Robineau-Desvoidy, 1830)

Material examined: Elazığ, Center, Gököy, 38°55' N, 39°07' E, 1164 m, 11.06.2022, 2♀♀, 4♂♂; Kovancılar, Saraybahçe, 38°44' N, 39°55' E, 949 m, 23.07.2022, 3♀♀, 2♂♂.

Chaetorellia loricata (Rondani, 1870)

Material examined: Elazığ, Center, Gököy, 38°55' N, 39°07' E, 1164 m, 11.06.2022, 1♀, 3♂♂; Kovancılar, Saraybahçe, 38°44' N, 39°55' E, 949 m, 23.07.2022, 2♂♂; Center, Muratçık, 38°52' N, 38°58' E, 898 m, 21.06.2023, 1♀, 1♂; Center, Center, 38°39' N, 39°12' E, 1065 m, 20.07.2023, 2♂♂; Center, Salkaya, 38°45' N, 39°12' E, 1090 m, 22.07.2023, 1♂; Keban, Çalık, 38°44' N, 38°47' E, 917 m, 23.07.2023, 1♂, 1♀.

Chaetorellia succinea (Costa, 1845)

Material examined: Elazığ, Center, Gököy, 38°55' N, 39°07' E, 1164 m, 11.06.2022, 1♂; Kovancılar, Saraybahçe, 38°44' N, 39°55' E, 949 m, 23.07.2022, 3♂♂; Sivrice, Kavaktepe, 38°30' N, 39°10' E, 1062 m, 24.07.2022, 1♀, 3♂♂.

Euaresta bullans (Wiedemann, 1830)

Material examined: Elazığ, Center, Çötelli, 38°46' N, 39°00' E, 1063 m, 21.07.2022, 6♀♀, 8♂♂; Sivrice, Kavaktepe, 38°30' N, 39°10' E, 1062 m, 24.07.2022, 9♂♂.

Ensina sonchi (Linnaeus, 1767)

Material examined: Elazığ, Sivrice, Kavaktepe, 38°30' N, 39°10' E, 1062 m, 24.07.2022, 1♂; Baskil, Şahaplı, 38°30' N, 38°47' E, 1117 m, 18.06.2023, 1♀; Center, Sugözü, 38°41' N, 39°16' E, 1204 m, 21.07.2023, 2♂♂.

Myopites apicatus Freidberg, 1980

Material examined: Elazığ, Baskil, Şahaplı, 38°32' N, 38°48' E, 1098 m, 20.07.2022, 1♀, 2♂♂; Alacakaya, Sarıkamış, 38°36' N, 39°44' E, 884 m, 22.07.2022, 3♂♂; Sivrice, Dörtbölük, 38°24' N, 39°12' E, 1503 m, 20.07.2023, 4♂♂; Center, Güneyçayırı, 38°42' N, 39°18' E, 1492 m, 21.07.2023, 1♀.

Orellia falcata (Scopoli, 1763)

Material examined: Elazığ, Center, Gülmahmut, 38°55' N, 39°04' E, 1148 m, 12.06.2022, 2♀♀, 2♂♂.

Orellia stictica (Gmelin, 1790)

Material examined: Elazığ, Center, Gököy, 38°55' N, 39°07' E, 1164 m, 11.06.2022, 1♀, 1♂; Center, Koruköy, 38°48' N, 39°00' E, 993 m, 21.06.2023, 1♀, 1♂.

Sphenella marginata (Fallén, 1814)

Material examined: Elazığ, Baskil, Şahaplı, 38°30' N, 38°47' E, 1117 m, 18.06.2023, 1♀, 1♂; Center, Şahsuvar, 38°38' N, 39°36' E, 932 m, 20.06.2023, 2♀♀, 3♂♂; Keban, Bahçeli, 38°45' N, 38°45' E, 1289 m, 20.06.2023, 1♂.

Tephritis acanthiophilopsis Hering, 1938

Material examined: Elazığ, Baskil, Şahaplı, 38°31' N, 38°47' E, 1065 m, 18.06.2023, 2♀♀, 2♂♂.

Tephritis divisa Rondani, 1871

Material examined: Elazığ, Baskil, Hacımustafa, 38°37' N, 38°50' E, 1595 m, 21.07.2022, 2♀♀; Baskil, Şahaplı, 38°30' N, 38°47' E, 1117 m, 18.06.2023, 2♂♂; Center, Şahsuvar, 38°38' N, 39°38' E, 913 m, 20.06.2023, 2♂♂; Center, Güneyçayırı, 38°42' N, 39°18' E, 1492 m, 21.07.2023, 1♀♀.

Tephritis fallax (Loew, 1844)

Material examined: Elazığ, Baskil, Şahaplı, 38°30' N, 38°47' E, 1117 m, 18.06.2023, 3♀♀; Center, Şahsuvar, 38°38' N, 39°38' E, 913 m, 20.06.2023, 1♀, 1♂.

Tephritis nigricauda (Loew, 1856)

Material examined: Elazığ, Center, Şahsuvar, 38°38' N, 39°38' E, 913 m, 20.06.2023, 1♀, 1♂.

Tephritis postica (Loew, 1844)

Material examined: Elazığ, Center, Cumhuriyet, 39°06' N, 39°17' E, 1096 m, 12.06.2022, 1♂; Center, Gülmahmut, 38°55' N, 39°04' E, 1148 m, 12.06.2022, 1♀♀; Baskil, Şahaplı, 38°30' N, 38°47' E, 1117 m, 18.06.2023, 1♀, 1♂; Baskil, Doğancık, 38°34' N, 38°50' E, 1346 m, 19.06.2023, 4♂♂; Center, Muratçık, 38°52' N, 38°58' E, 898 m, 21.06.2023, 4♀♀, 5♂♂; Center, Sugözü, 38°41' N, 39°16' E, 1204 m, 21.07.2023, 1♀, 2♂.

Tephritis recurrens Loew, 1869

Material examined: Elazığ, Baskil, Hacımustafa, 38°37' N, 38°50' E, 1595 m, 21.07.2022, 1♂, 1♀; Baskil, Şahaplı, 38°30' N, 38°47' E, 1117 m, 18.06.2023, 1♂, 1♀.

Tephritomyia lauta (Loew, 1869)

Material examined: Elazığ, Center, Sakabaşı, 38°47' N, 39°01' E, 1251 m, 11.06.2022, 13♀♀, 17♂♂; Center, Gülmahmut, 38°55' N, 39°04' E, 1148 m, 12.06.2022, 19♀♀, 11♂♂; Center, Kömürhan, 38°29' N, 38°49' E, 1097 m, 12.07.2022, 13♀♀, 8♂♂; Baskil, Şahaplı, 38°31' N, 38°47' E, 1064 m, 20.07.2022, 22♀♀, 16♂♂; Baskil, Hacımustafa, 38°37' N, 38°50' E, 1595 m, 21.07.2022, 17♀♀, 14♂♂; Center, Çötelli, 38°46' N, 39°00' E, 1063 m, 21.07.2022, 15♀♀, 10♂♂; Kovancılar, Koçkale, 38°35' N, 39°29' E, 900 m, 22.07.2022, 14♀♀, 15♂♂; Alacakaya, Sarıkamış, 38°36' N, 39°44' E, 884 m, 22.07.2022, 14♀♀, 9♂♂; Kovancılar, Kuşçu, 38°48' N, 39°58' E, 1134 m, 23.07.2022, 16♀♀, 12♂♂; Kovancılar, Saraybahçe, 38°44' N, 39°55' E, 949 m, 23.07.2022, 25♀♀, 21♂♂; Baskil, Şahaplı, 38°30' N, 38°47' E, 1117 m, 18.06.2023, 14♀♀, 15♂♂; Center, Şahsuvar, 38°38' N, 39°36' E, 932 m, 20.06.2023, 15♀♀, 11♂♂; Center, Şahsuvar, 38°38' N, 39°38' E, 913 m, 20.06.2023, 14♀♀, 12♂♂; Center, Koruköy, 38°48' N, 39°00' E, 993 m, 21.06.2023, 13♀♀, 11♂♂; Center, Muratçık, 38°52' N, 38°58' E, 898 m, 21.06.2023, 35♀♀, 22♂♂; Keban, Bahçeli, 38°45' N, 38°45' E, 1289 m, 20.06.2023, 17♀♀, 19♂♂; Sivrice, Dörtbölük, 38°24' N, 39°12' E, 1503 m, 20.07.2023, 16♀♀, 19♂♂; Center, Sugözü, 38°41' N, 39°16' E, 1204 m, 21.07.2023, 27♀♀, 18♂♂; Center, Güneyçayırı, 38°42' N, 39°18' E, 1492 m, 21.07.2023, 14♀♀, 12♂♂; Center, Güneyçayırı, 38°41' N, 39°17' E, 1231 m, 22.07.2023, 23♀♀, 22♂♂; Center, Salkaya, 38°45' N, 39°12' E, 1090 m, 22.07.2023, 13♀♀, 17♂♂; Keban, Çalık, 38°44' N, 38°47' E, 917 m, 23.07.2023, 19♀♀, 17♂♂; Keban, Bahçeli, 38°45' N, 38°45' E, 1289 m, 23.07.2023, 15♀♀, 26♂♂.

Trupanea amoena (Frauenfeld, 1857)

Material examined: Elazığ, Center, Gülmahmut, 38°55' N, 39°04' E, 1148 m, 12.06.2022, 3♂♂; Baskil, Şahaplı, 38°30' N, 38°47' E, 1117 m, 18.06.2023, 2♀♀; Center, Şahsuvar, 38°38' N, 39°36' E, 932 m, 20.06.2023, 3♀♀; Kovancılar, Beşpınar, 38°40' N, 39°48' E, 1060 m, 20.06.2023, 4♀♀, 3♂♂; Center, Şahsuvar, 38°38' N, 39°38' E, 913 m, 20.06.2023, 2♂♂; Center, Salkaya, 38°45' N, 39°12' E, 1090 m, 22.07.2023, 6♀♀, 5♂♂.

Trupanea stellata (Fuesslin, 1775)

Material examined: Elazığ, Baskil, Hacımustafa, 38°37' N, 38°50' E, 1595 m, 21.07.2022, 3♀♀, 1♂.

Terellia gynaecochroma (Hering, 1937)

Material examined: Elazığ, Center, Cumhuriyet, 39°06' N, 39°17' E, 1096 m, 12.06.2022, 3♂♂; Baskil, Şahaplı, 38°31' N, 38°47' E, 1064 m, 20.07.2022, 5♀♀, 18♂♂; Center, Çötelli, 38°46' N, 39°00' E, 1063 m, 21.07.2022, 2♂♂; Kovancılar, Saraybahçe, 38°44' N, 39°55' E, 949 m, 23.07.2022, 3♂♂; Baskil, Şahaplı, 38°30' N, 38°47' E, 1117 m, 18.06.2023, 1♀, 1♂; Center, Muratçık, 38°52' N, 38°58' E, 898 m, 21.06.2023, 1♂; Center, Sugözü, 38°41' N, 39°16' E, 1204 m, 21.07.2023, 2♀♀, 1♂; Center, Güneyçayırı, 38°41' N, 39°17' E, 1231 m, 22.07.2023, 2♀♀, 1♂.

Terellia luteola (Wiedemann, 1830)

Material examined: Elazığ, Center, Cumhuriyet, 39°06' N, 39°17' E, 1096 m, 12.06.2022, 3♂♂; Center, Gülmahmut, 38°55' N, 39°04' E, 1148 m, 12.06.2022, 8♀♀, 5♂♂; Baskil, Şahaplı, 38°31' N, 38°47' E, 1064 m, 20.07.2022, 5♀♀, 3♂♂; Center, Çötelli, 38°46' N, 39°00' E, 1063 m, 21.07.2022, 3♂♂; Kovancılar, Koçkale, 38°35' N, 39°29' E, 900 m, 22.07.2022, 5♀♀, 8♂♂; Alacakaya, Sarıkamış, 38°36' N, 39°44' E, 884 m, 22.07.2022, 3♀♀; Kovancılar, Saraybahçe, 38°44' N, 39°55' E, 949 m, 23.07.2022, 4♂♂; Sivrice, Kavaktepe, 38°30' N, 39°10' E, 1062 m, 24.07.2022, 3♀♀; Baskil, Doğancık, 38°34' N, 38°50' E, 1346 m, 19.06.2023, 4♀♀, 3♂♂; Center, Koruköy, 38°48' N, 39°00' E, 993 m, 21.06.2023, 7♀♀, 7♂♂; Center, Muratçık, 38°52' N, 38°58' E, 898 m, 21.06.2023, 3♀♀, 14♂♂; Center, Center, 38°39' N, 39°12' E, 1065 m, 20.07.2023, 7♂♂; Center, Güneyçayırı, 38°41' N, 39°17' E, 1231 m, 22.07.2023, 4♂♂; Center, Sarıçubuk, 38°40' N, 39°07' E, 1097 m, 22.07.2023, 3♀♀, 3♂♂.

Terellia nigripalpis Hendel, 1927

Material examined: Elazığ, Center, Muratçık, 38°52' N, 38°58' E, 898 m, 21.06.2023, 5♀♀, 10♂♂.

Terellia serratulae (Linnaeus, 1758)

Material examined: Elazığ, Center, Sakabaşı, 38°47' N, 39°01' E, 1251 m, 11.06.2022, 5♀♀, 6♂♂; Center, Gülmahmut, 38°55' N, 39°04' E, 1148 m, 12.06.2022, 8♀♀, 8♂♂; Baskil, Şahaplı, 38°32' N, 38°48' E, 1098 m, 20.07.2022, 5♀♀, 7♂♂; Alacakaya, Gümüşkaynak, 38°36' N, 39°44' E, 906 m, 22.07.2022, 3♀♀, 5♂♂; Baskil, Şahaplı, 38°52' N, 38°48' E, 1104 m, 19.06.2023, 9♀♀, 15♂♂; Center, Koruköy, 38°48' N, 39°00' E, 993 m, 21.06.2023, 5♂♂; Center, Muratçık, 38°52' N, 38°58' E, 898 m, 21.06.2023, 5♀♀, 10♂♂; Center, Güneyçayırı, 38°42' N, 39°18' E, 1492 m, 21.07.2023, 12♀♀, 15♂♂.

Terellia uncinata White, 1989

Material examined: Elazığ, Kovancılar, Saraybahçe, 38°44' N, 39°55' E, 949 m, 23.07.2022, 4♀♀, 3♂♂; Sivrice, Kavaktepe, 38°30' N, 39°10' E, 1062 m, 24.07.2022, 1♀, 5♂♂.

Terellia virens (Loew, 1846)

Material examined: Elazığ, Kovancılar, Koçkale, 38°35' N, 39°29' E, 900 m, 22.07.2022, 1♂; Alacakaya, Gümüşkaynak, 38°36' N, 39°44' E, 906 m, 22.07.2022, 1♂; Kovancılar, Saraybahçe, 38°44' N, 39°55' E, 949 m, 23.07.2022, 4♂♂; Sivrice, Kavaktepe, 38°30' N, 39°10' E, 1062 m, 24.07.2022, 3♀♀, 10♂♂; Palu, Üçdeğirmenler, 38°39' N, 39°53' E, 1503 m, 20.07.2023, 1♂.

Urophora affinis (Frauenfeld, 1857)

Material examined: Elazığ, Center, Gököy, 38°55' N, 39°07' E, 1164 m, 11.06.2022, 42♀♀, 51♂♂; Center, Kömürhan, 38°29' N, 38°49' E, 1097 m, 12.07.2022, 35♀♀, 21♂♂; Kovancılar, Koçkale, 38°35' N, 39°29' E, 900 m, 22.07.2022, 24♀♀, 28♂♂; Baskil, Şahaplı, 38°30' N, 38°47' E, 1117 m, 18.06.2023, 15♀♀, 17♂♂; Center, Şahsuvar, 38°38' N, 39°36' E, 932 m, 20.06.2023, 32♀♀, 34♂♂; Center, Koruköy, 38°48' N, 39°00' E, 993 m, 21.06.2023, 21♀♀, 23♂♂; Sivrice, Dörtbölük, 38°24' N, 39°12' E, 1503 m, 20.07.2023, 2♂♂.

Urophora aprica (Fallén, 1814)

Material examined: Elazığ, Center, Gülmahmut, 38°55' N, 39°04' E, 1148 m, 12.06.2022, 8♀♀, 11♂♂.

Urophora cuspidata (Meigen, 1826)

Material examined: Elazığ, Baskil, Aladikme, 38°46' N, 39°27' E, 1096 m, 10.06.2022, 1♀♀, 1♂; Center, Gököy, 38°55' N, 39°07' E, 1164 m, 11.06.2022, 1♀; Center, Gülmahmut, 38°55' N, 39°04' E, 1148 m, 12.06.2022, 3♀♀, 1♂; Alacakaya, Gümüşkaynak, 38°36' N, 39°44' E, 906 m, 22.07.2022, 1♀.

Urophora jaceana (Hering, 1935)

Material examined: Elazığ, Center, Şahsuvar, 38°38' N, 39°36' E, 932 m, 20.06.2023, 4♀♀, 3♂♂; Kovancılar, Beşpınar, 38°40' N, 39°48' E, 1060 m, 20.06.2023, 1♀.

Urophora mauritanica Macquart, 1851

Material examined: Elazığ, Center, Öksüzuşağı, 38°46' N, 39°05' E, 1328 m, 10.06.2022, 3♂♂; Kovancılar, Saraybahçe, 38°44' N, 39°55' E, 949 m, 23.07.2022, 2♀♀, 1♂; Sivrice, Kavaktepe, 38°30' N, 39°10' E, 1062 m, 24.07.2022, 1♀, 4♂♂; Center, Center, 38°39' N, 39°12' E, 1065 m, 20.07.2023, 1♀.

Urophora phalolepidis Merz&White, 1991

Material examined: Elazığ, Center, Öksüzuşağı, 38°46' N, 39°05' E, 1328 m, 10.06.2022, 3♂♂; Kovancılar, Saraybahçe, 38°44' N, 39°55' E, 949 m, 23.07.2022, 1♂; Center, Şahsuvar, 38°38' N, 39°36' E, 932 m, 20.06.2023, 1♂; Center, Center, 38°39' N, 39°12' E, 1065 m, 20.07.2023, 1♀.

Urophora quadrifasciata (Meigen, 1826)

Material examined: Elazığ, Center, Gököy, 38°55' N, 39°07' E, 1164 m, 11.06.2022, 2♀♀, 2♂♂; Kovancılar, Kuşçu, 38°48' N, 39°58' E, 1134 m, 23.07.2022, 4♀♀, 2♂♂; Kovancılar, Saraybahçe, 38°44' N, 39°55' E, 949 m, 23.07.2022, 5♀♀, 4♂♂; Center, Şahsuvar, 38°38' N, 39°36' E, 932 m, 20.06.2023, 3♀♀, 2♂♂.

***Urophora solstitialis* (Linnaeus, 1758)**

Material examined: Elazığ, Center, Çötelli, 38°46' N, 39°00' E, 1063 m, 21.07.2022, 5♂♂; Alacakaya, Sarıkamış, 38°36' N, 39°44' E, 884 m, 22.07.2022, 1♀, 2♂♂; Baskil, Doğancık, 38°34' N, 38°50' E, 1346 m, 19.06.2023, 1♂; Center, Şahsuvar, 38°38' N, 39°36' E, 932 m, 20.06.2023, 2♂♂; Kovancılar, Beşpınar, 38°40' N, 39°48' E, 1060 m, 20.06.2023, 1♀, 2♂♂; Center, Muratçık, 38°52' N, 38°58' E, 898 m, 21.06.2023, 1♀; Sivrice, Dörtbölük, 38°24' N, 39°12' E, 1503 m, 20.07.2023, 1♂; Palu, Üçdeğirmenler, 38°39' N, 39°53' E, 1503 m, 20.07.2023, 1♀; Center, Center, 38°39' N, 39°12' E, 1065 m, 20.07.2023, 1♀, 3♂♂; Center, Sugözü, 38°41' N, 39°16' E, 1204 m, 21.07.2023, 7♂♂; Center, Güneyçayırı, 38°41' N, 39°17' E, 1231 m, 22.07.2023, 1♂; Center, Salkaya, 38°45' N, 39°12' E, 1090 m, 22.07.2023, 1♀, 1♂; Center, Sarıçubuk, 38°40' N, 39°07' E, 1097 m, 22.07.2023, 2♂♂.

***Urophora terebrans* (Loew, 1850)**

Material examined: Elazığ, Kovancılar, Saraybahçe, 38°44' N, 39°55' E, 949 m, 23.07.2022, 7♂♂; Center, Sarıçubuk, 38°40' N, 39°07' E, 1097 m, 22.07.2023, 2♀♀, 1♂.

4. Conclusions and discussion

Although no species new to science or new records for the Turkish fauna were identified in this study, this research represents the first comprehensive faunistic research of Tephritidae in Elazığ Province. Except for *Tephritis postica*, which was previously reported from Elazığ Province in the doctoral thesis of Görmez [25] all identified species are reported for the first time from this province. The absence of previously published faunistic data from Elazığ indicates that the regional distribution of many Tephritidae species has remained undocumented until now. Therefore, this study fills an important gap in the knowledge of fruit fly distribution in Eastern Anatolia. These findings emphasize the importance of regional faunistic studies, particularly in underexplored areas, for improving our understanding of species distribution patterns and biodiversity at both national and regional scales.

In conclusion, the field studies conducted in Elazığ province to determine the fruit fly fauna revealed valuable insights into the diversity and distribution of species in the region. The highest species diversity in the study area was observed within the subfamilies Tephritinae and Terellinae, followed by Myopitinae. Among the identified species, *Tephritomyia lauta* was found to be the most widely distributed, being recorded from numerous sampling localities across the study area. In contrast, *Urophora aprica*, *Tephritis acanthiophilopsis*, *Trupanea stellata*, *Terellia nigripalpis* and *Orellia falcata* exhibited the most limited distributions, as they were recorded from only a few localities within the region. The Shannon-Wiener diversity index ($H' = 2.163$) indicates a moderately high diversity level within the sampled Tephritidae fauna of Elazığ Province, reflecting both species richness and the contribution of many low-abundance species across different localities. The Pielou Evenness value ($J' = 0.590$) further shows that individuals were moderately balanced among species, although the fauna was partly dominated by abundant taxa such as *Tephritomyia lauta*, *Acanthophilus helianthi*, and *Urophora affinis*.

Table 2. Diversity indices calculated for the sampled Tephritidae fauna in Elazığ Province

Species	ni	pi	ln(pi)	pi × ln(pi)
<i>Acanthophilus helianthi</i>	392	0.161649	-1.822325	-0.294578
<i>Campiglossa bidentis</i>	16	0.006598	-5.020998	-0.033128
<i>Campiglossa producta</i>	9	0.003711	-5.596362	-0.020770
<i>Chaetorellia acrolophi</i>	92	0.037938	-3.271798	-0.124126
<i>Chaetorellia carthami</i>	6	0.002474	-6.001827	-0.014850
<i>Chaetorellia conjuncta</i>	20	0.008247	-4.797855	-0.039570
<i>Chaetorellia jaceae</i>	11	0.004536	-5.395692	-0.024475
<i>Chaetorellia loricata</i>	11	0.004536	-5.395692	-0.024475
<i>Chaetorellia succinea</i>	8	0.003299	-5.714145	-0.018851
<i>Euaresta bullans</i>	23	0.009485	-4.658093	-0.044180
<i>Ensina sonchi</i>	4	0.001649	-6.407292	-0.010569
<i>Myopites apicatus</i>	11	0.004536	-5.395692	-0.024475
<i>Orellia falcata</i>	4	0.001649	-6.407292	-0.010569
<i>Orellia stictica</i>	4	0.001649	-6.407292	-0.010569
<i>Sphenella marginata</i>	8	0.003299	-5.714145	-0.018851

Table 2. Continued

<i>Tephritis acanthiophilopsis</i>	4	0.001649	-6.407292	-0.010569
<i>Tephritis divisa</i>	7	0.002887	-5.847677	-0.016880
<i>Tephritis fallax</i>	5	0.002062	-6.184149	-0.012751
<i>Tephritis nigricauda</i>	2	0.000825	-7.100440	-0.005856
<i>Tephritis postica</i>	22	0.009072	-4.702544	-0.042662
<i>Tephritis recurrens</i>	4	0.001649	-6.407292	-0.010569
<i>Tephritomyia lauta</i>	1016	0.418969	-0.869958	-0.364486
<i>Trupanea amoena</i>	28	0.011546	-4.461382	-0.051513
<i>Trupanea stellata</i>	4	0.001649	-6.407292	-0.010569
<i>Terellia gynaecochochroma</i>	34	0.014021	-4.267226	-0.059829
<i>Terellia luteola</i>	77	0.031753	-3.449781	-0.109539
<i>Terellia nigripalpis</i>	15	0.006186	-5.085537	-0.031457
<i>Terellia serratulae</i>	98	0.040412	-3.208619	-0.129668
<i>Terellia uncinata</i>	13	0.005361	-5.228637	-0.028030
<i>Terellia virens</i>	20	0.008247	-4.797855	-0.039570
<i>Urophora affinis</i>	345	0.142268	-1.950042	0.277429
<i>Urophora aprica</i>	19	0.007835	-4.849148	-0.037993
<i>Urophora cuspidata</i>	8	0.003299	-5.714145	-0.018851
<i>Urophora jaceana</i>	8	0.003299	-5.714145	-0.018851
<i>Urophora mauritanica</i>	13	0.005361	-5.228637	-0.028030
<i>Urophora phalolepidis</i>	6	0.002474	-6.001827	-0.014850
<i>Urophora quadrifasciata</i>	24	0.009897	-4.615533	-0.045680
<i>Urophora solstitialis</i>	34	0.014021	-4.267226	-0.059829
<i>Urophora terebrans</i>	10	0.004478	-5.410606	-0.02423

Total individuals (N): 2435

Species count (S): 39

Shannon-Wiener diversity index (H'): 2.163

Pielou Evenness (J'): 0.590

Nevertheless, the restricted occurrence of some species within the sampled localities may be related to local habitat conditions, sampling coverage, or host plant availability; however, additional ecological studies are needed to clarify these relationships. Overall, these findings contribute to our understanding of fruit fly diversity and provide a basis for future research.

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