

Fruit Fly (Diptera: Tephritidae) Fauna of Yozgat Province, Turkey

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ABSTRACT

Main purpose of this study is to determine of fruit fly species which were distributed in Yozgat province. In this study, a total of 983 adult fruit fly samples were collected from Yozgat province between 2016-2018. Samples were collected using insect net from possible host plants and killed in ethyl acetate killing jars. The obtained fruit flies were brought to the laboratory and prepared for the species identification. As a result of identification, 13 genera and 38 species were determined from 3 subfamilies (Myopitinae, Tephritinae and Terellinae) of the fruit fly family. In the paper wing figures and host plants of each species has been presented.

Research Article

Article History

Received : 30.10.2018

Accepted : 21.01.2019

Keywords

Fruit flies
Tephritidae
Fauna
Yozgat
Turkey

Yozgat İli Meyve Sineği (Diptera: Tephritidae) Faunası, Türkiye

ÖZET

Bu çalışmanın temel amacı Yozgat ilinde yayılış gösteren meyve sineği türlerini belirlemektir. Bu çalışma da, Yozgat ili içerisinde 2016-2018 yılları arasında toplam 983 meyve sineği ergini toplanmıştır. Örnekler muhtemel konukçu bitkiler üzerinden atrap ile toplanmış ve etil asetatlı öldürme şişelerinde öldürülmüştür. Elde edile ergin meyve sinekler laboratuvara getirilerek peraparasyonları yapılmış ve tür teşhisi için hazır hale getirilmiştir. Teşhis işlemleri sonucunda meyve sinekleri familyasından 3 alt familya (Myopitinae, Tephritinae ve Terellinae) içerisinde 13 cins ve toplam 38 tür tespit edilmiştir. Makalede, her bir türün kanat fotoğrafları ve konukçu bitkileri sunulmuştur.

Araştırma Makalesi

Makale Tarihçesi

Geliş Tarihi : 30.10.2018

Kabul Tarihi : 21.01.2019

Anahtar Kelimeler

Meyve sinekleri
Tephritidae
Fauna
Yozgat
Türkiye

To Cite : Kütük M, Yaran M, Torbalı M, Görmez V 2019. Fruit Fly (Diptera: Tephritidae) Fauna of Yozgat Province, Turkey. KSÜ Tarım ve Doğa Derg 22(2): 238-247. DOI: 10.18016/ksutarimdog.v22i42694.476127

INTRODUCTION

Tephritidae are picture-winged flies of variable size and belonging to the superfamily Tephritoidea within the suborder Brachycera. (De Meyer 2006). According to Pape et al., (2011), fruit flies (Diptera: Tephritidae) include 492 genera and 4,792 species, considering the controversial species within these species, there may be differences in the number of species. It seems that we already have enough supra-generic taxa and that limited number of additional genera are still to be discovered. Currently, it is generally acknowledged that there are probably 1500 fruit fly species relating to fruits; more than 250 species of which are of economic significance (Li et al., 2013)

Faunistic studies on the fruit fly fauna in Turkey began with Giray (1966). Giray (1979, presented first check list of fruit flies and listed 51 species from Turkey. Over the last 40 years, many species recorded

and described from Turkey.

164 species of fruit flies species of fruit flies have been reported up to date. (Yaran and Kütük, 2016; Yaran et. al, 2018a; Yaran et. al, 2018b)

The main purpose of this study was to determine the fruit fly species distributed in Yozgat province. In the study, we determined 38 species of fruit flies which were distributed in Yozgat province. In the paper, wing figures and host plants of each species have been presented.

MATERIALS and METHODS

Adult specimens of fruit flies collected from various region of Yozgat province using insect net from host plants between 2016 and 2018. The obtained fruit flies were brought to the laboratory and prepared in standard museum methods. Thus, all the specimens

were made ready for the species identification. Samples were identified by using the keys of Freidberg and Kugler (1989), Hendel (1927), Merz (1994), Korneyev and White (1993 and 1999), Korneyev (2003, 2006), Korneyev and Evstigneev (2013), Korneyev et al. (2013), Kütük (2006) and White (1988). Fruit flies materials were deposited in insect laboratory of Gaziantep University.

RESULTS

In this study, 38 species belonging to 13 genera in 3 (Myopitinae, Tephritinae, Terellinae) subfamilies have been determined from Yozgat province. Wing figures, specimens examined and host plants of each species have been presented in the paper. Species listed in alphabetical order.

Acanthiophilus helianthi (Rossi, 1794)

Specimens examined (Figure 1): Yozgat, Sorgun, Sarıhamzalı, 39°68' N, 35°23' E, 1061 m, 01.VII.2016, 4 ♂♂; Sarıkaya, Yeşilkışla, 39°24' N, 35°21' E, 1220 m, 28.VI.2017, 5 ♀♀, 6 ♂♂; Sarıkaya, Bağlıca, 39°35' N, 35°15' E, 1118 m, 28.VI.2017, 1 ♀, 1 ♂; Sorgun, Doğankent, 39°41' N, 35°23' E, 1090 m, 28.VI.2017, 3 ♀♀, 3 ♂♂; Akdağmadeni, Centrum, 39°42' N, 35°52' E, 1220 m, 28.VI.2017, 1 ♀; Akdağmadeni, Bulgurlu, 39°48' N, 35°53' E, 1430 m, 28.VI.2017, 2 ♂♂; Centrum, Özlüce, 39°29' N, 35°03' E, 1060 m, 2.VII.2017, 1 ♀; Centrum, Kalınbük, 39°56' N, 34°41' E, 1181 m, 25.VII.2017, 1 ♀, 1 ♂; Centrum, Topçu, 39°42' N, 34°50' E, 1155 m, 19.VI.2018, 1 ♀, 2 ♂♂; Sarıkaya, Akbenliçiftliği, 39°29' N, 35°22' E, 1244 m, 23.VI.2018, 1 ♀.

Host plants: *Carduus nutans*, *Carthamus tinctorius*, *Cart. glaucus*, *Cart. tenuis*, *Centaurea calpitropa*, *Cent. iberica*, *Cent. nigra*, *Cent. pallescens*, *Cent. pichleri*, *Cent. procurrens*, *Cent. solstitialis*, *Circium arvense*, *Circ. vulgare*, *Echinops* sp., *Onopordum acanthium*, *Picnomon acarna*, *Xhantium spinosum* (Giray 1979; White, 1988; Freidberg and Kugler, 1989; Merz, 1994; Kütük, 2003a).

Chaetorellia jaceae (Robineau - Desvoidy, 1830)

Specimens examined (Figure 2): Yozgat, Boğazlıyan, Yapalak, 39°25' N, 35°26' E, 1124 m, 27.VI.2016, 1 ♀, 1 ♂; Çekerek, Centrum, 40°05' N, 35°51' N, 835 m, 01.VII.2016, 2 ♂♂; Sorgun, Sarıhamzalı, 39°68' N, 35°23' E, 1061 m, 01.VII.2016, 1 ♂; Saraykent, Körük, 39°41' N, 35°40' E, 1267 m, 28.VI.2017, 1 ♂.

Host plants: *Centaurea debeauxii*, *Cent. jacea*, *Cent. nigra*, *Cent. splendens* (White, 1988; Merz, 1994).

Chaetorellia loricata (Rondani, 1830)

Specimens examined (Figure 3): Yozgat, Sarıkaya, Boyalık, 39°42' N, 35°41' E, 1218 m, 27.VI.2016, 1 ♀, 1 ♂; Sorgun, Aşağıkarakaya, 39°81' N, 35°05' E, 1112 m, 27.VI.2016, 1 ♀, 2 ♂♂; Boğazlıyan, Centrum, 39°16' N, 35°24' E, 1059 m, 01.VII.2016, 1 ♂; Sarıkaya,

Yeşilkışla, 39°24' N, 35°21' E, 1220 m, 28.VI.2017, 6 ♀♀, 13 ♂♂; Sarıkaya, Bağlıca, 39°35' N, 35°15' E, 1118 m, 28.VI.2017, 2 ♀♀, 24 ♂♂.

Host plants: *Centaurea alpestris*, *Cent. scabiosa*, *Cent. tenuifolia*, *Onopordum tauricum* (White and Macquardt, 1988; Merz, 1994; Kütük, 2003a).

Chaetorellia succinea (Costa, 1844)

Specimens examined (Figure 4): Yozgat, Akdağmadeni, Centrum, 39°42' N, 35°52' E, 1220 m, 28.VI.2017, 7 ♀♀, 7 ♂♂.

Host plants: *Centaurea calpitropa*, *Cent. hyalolepis*, *Cent. iberica*, *Cent. lunulata*, *Cent. pallescens*, *Cent. solstitialis*, *Circium arvense* (Giray, 1979; Freidberg and Kugler, 1989; Kütük, 2003a).

Chaetostomella cylindrica (Robineau - Desvoidy, 1830)

Specimens examined (Figure 5): Yozgat, Sorgun, Sarıhamzalı, 39°68' N, 35°23' E, 1061 m, 01.VII.2016, 1 ♂; Sarıkaya, Yeşilkışla, 39°24' N, 35°21' E, 1220 m, 28.VI.2017, 3 ♂♂; Sarıkaya, Bağlıca, 39°35' N, 35°15' E, 1118 m, 28.VI.2017, 2 ♂♂; Centrum, Topçu, 39°42' N, 34°50' E, 1155 m, 19.VI.2018, 3 ♂♂; Centrum, Tayıp, 39°50' N, 34°42' E, 1209 m, 19.VI.2018, 1 ♀, 2 ♂♂; Centrum, Evcı, 39°51' N, 34°42' E, 1192 m, 19.VI.2018, 2 ♂♂; Sorgun, Aşağıkarakaya, 39°49' N, 35°01' E, 1140 m, 23.VI.2018, 2 ♂♂; Sarıkaya, Akbenliçiftliği, 39°29' N, 35°22' E, 1244 m, 23.VI.2018, 2 ♀♀, 8 ♂♂.

Host plants: *Arctium tomentosum*, *Carduus crispus*, *Card. nutans*, *Carthamus tenuis*, *Centaurea bracteata*, *Cent. cyanus*, *Cent. iberica*, *Cent. jacea*, *Cent. maculosa*, *Cent. montana*, *Cent. nervosa*, *Cent. nigra*, *Cent. nigrescens*, *Cent. scabiosa*, *Cent. solstitialis*, *Cent. triumfetti*, *Circium aculae*, *Circ. arvense*, *Circ. eriophorum*, *Circ. eristhales*, *Circ. gaillardotii*, *Circ. oleraceum*, *Circ. palustre*, *Circ. rivulare*, *Circ. tuberosum*, *Circ. vulgare*, *Cousinia hermonis*, *Crupina vulgaris*, *Echinops viscosus*, *Jurinea mollis*, *Onopordum acanthium*, *Onop. cynarocephalum*, *Onop. floccosum*, *Picnomon acarna*, *Serratula tinctoria* (White, 1988; Freidberg and Kugler, 1989; Merz, 1994; Kütük and Özgür, 2003).

Euaresta bullans (Wiedemann, 1830)

Specimens examined (Figure 6): Yozgat, Sorgun, Aşağıkarakaya, 39°81' N, 35°05' E, 1112 m, 27.VI.2016, 3 ♂♂; Sorgun, Sarıhamzalı, 39°68' N, 35°23' E, 1061 m, 01.VII.2016, 1 ♀; Boğazlıyan, Centrum, 39°16' N, 35°24' E, 1059 m, 01.VII.2016, 1 ♀; Sorgun, Çayözü, 39°44' N, 35°13' E, 1450 m, 28.VI.2017, 1 ♂; Sorgun, Doğankent, 39°41' N, 35°23' E, 1090 m, 28.VI.2017, 6 ♀♀, 13 ♂♂; Saraykent, Körük, 39°41' N, 35°40' E, 1267 m, 28.VI.2017, 1 ♂; Akdağmadeni, Bulgurlu, 39°48' N, 35°53' E, 1430 m, 28.VI.2017, 9 ♀♀, 14 ♂♂; Centrum, Büyükincirli, 39°37' N, 34°55' E, 1028 m, 19.VI.2018, 1 ♀; Centrum, Topçu, 39°42' N, 34°50' E, 1155 m, 19.VI.2018, 8 ♀♀,

6 ♂♂; Centrum, Tayıp, 39°50' N, 34°42' E, 1209 m, 19.VI.2018, 1 ♂; Centrum, Evci, 39°51' N, 34°42' E, 1192 m, 19.VI.2018, 28 ♀♀, 25 ♂♂; Sorgun, Aşağıkarakaya, 39°49' N, 35°01' E, 1140 m, 23.VI.2018, 1 ♀, 1 ♂.

Host plants: *Xanthium spinosum* (Freidberg and Kugler, 1989; Kütük, 2003a).

Orellia falcata (Scopoli, 1763)

Specimens examined (Figure 7): Yozgat, Sarıkaya, Yeşilkışla, 39°24' N, 35°21' E, 1220 m, 28.VI.2017, 1 ♂.

Host plants: *Onopordum tauricum*, *Tragopogon longirostre*, *Trag. orientale*, *Trag. pratensis* (White, 1988; Freidberg and Kugler, 1989; Merz, 1994; Kütük, 2003a).

Orellia stictica (Gmelin, 1790)

Specimens examined (Figure 8): Yozgat, Centrum, Özlüce, 39°29' N, 35°03' E, 1060 m, 2.VII.2017, 2 ♂♂; Centrum, Tayıp, 39°50' N, 34°42' E, 1209 m, 19.VI.2018, 1 ♀, 5 ♂♂; Sarıkaya, Akbenliçiftliği, 39°29' N, 35°22' E, 1244 m, 23.VI.2018, 1 ♀.

Host plants: *Cirsium arvense*, *Onopordum tauricum*, *Tragopogon orientale* (Merz, 1994; Kütük, 2003a).

Oxyna flavipennis (Loew, 1844)

Specimens examined (Figure 9): Yozgat, Akdağmadeni, Centrum, 39°42' N, 35°52' E, 1220 m, 28.VI.2017, 1 ♂.

Host plants: *Achillea fragrantissima*, *Echinops viscosus*, *Leucanthemum vulgare*, *Tanacetum corymbosum* (White, 1988; Freidberg and Kugler, 1989; Merz, 1994; Kütük, 2003a).

Sphenella marginata (Fallen, 1814)

Specimens examined (Figure 10): Yozgat, Sarıkaya, Akbenliçiftliği, 39°29' N, 35°22' E, 1244 m, 23.VI.2018, 1 ♀.

Host plants: *Senecio desfontainei*, *Sene. doriiformis*, *Sene. erucifolius*, *Sene. gezogen*, *Sene. jacobaea*, *Sene. rupester*, *Sene. vernalis*, *Sene. viscosus*, *Sene. vulgaris*, *Vicia sp.* (White, 1988; Freidberg and Kugler, 1989; Merz, 1994; Kütük, 2003a).

Tephritis acanthiophilopsis Hering, 1938

Specimens examined (Figure 11): Yozgat, Sorgun, Doğankent, 39°41' N, 35°23' E, 1090 m, 28.VI.2017, 1 ♂; Akdağmadeni, Centrum, 39°42' N, 35°52' E, 1220 m, 28.VI.2017, 1 ♂.

Host plants: *Carduus nutans*, *Centaurea iberica*, *Cirsium arvense*, *Circ. vulgare* (Merz, 1994).

Tephritis bardanae (Schrank, 1803)

Specimens examined (Figure 12): Yozgat, Akdağmadeni, Centrum, 39°42' N, 35°52' E, 1220 m, 28.VI.2017, 5 ♀♀, 8 ♂♂; Centrum, Büyükincirli, 39°37' N, 34°55' E, 1028 m, 19.VI.2018, 1 ♀; Centrum, Tayıp,

39°50' N, 34°42' E, 1209 m, 19.VI.2018, 3 ♂♂.

Host plants: *Arctium lappa*, *Arct. minus* (White 1988).

Tephritis divisa Rondani, 1871

Specimens examined (Figure 13): Yozgat, Akdağmadeni, Bulgurlu, 39°48' N, 35°53' E, 1430 m, 28.VI.2017, 1 ♀.

Host plants: *Picris echioides* (Merz, 1994).

Tephritis formosa (Loew, 1844)

Specimens examined (Figure 14): Yozgat, Akdağmadeni, Centrum, 39°42' N, 35°52' E, 1220 m, 28.VI.2017, 3 ♀♀, 4 ♂♂; Centrum, Topçu, 39°42' N, 34°50' E, 1155 m, 19.VI.2018, 4 ♀♀, 4 ♂♂.

Host plants: *Crepis virens*, *Hypochaeris radicata*, *Sonc. aspera*, *Sonc. arvensis*, *Sonc. oleraceus* (White, 1988; Freidberg and Kugler, 1989; Merz, 1994; Kütük, 2003a).

Tephritis matricariae (Loew, 1844)

Specimens examined (Figure 15): Yozgat, Akdağmadeni, Bulgurlu, 39°48' N, 35°53' E, 1430 m, 28.VI.2017, 3 ♀♀.

Host plants: *Crepis foetida*, *Crep. taraxacifolia*, *Crep. vesicaria* (Merz, 1994).

Tephritis postica (Loew, 1844)

Specimens examined (Figure 16): Yozgat, Çekerek, Centrum, 40°05' N, 35°51' N, 835 m, 01.VII.2016, 1 ♀; Sorgun, Sarıhamzalı, 39°68' N, 35°23' E, 1061 m, 01.VII.2016, 3 ♀♀, 4 ♂♂; Sarıkaya, Yeşilkışla, 39°24' N, 35°21' E, 1220 m, 28.VI.2017, 5 ♀♀, 2 ♂♂; Sorgun, Doğankent, 39°41' N, 35°23' E, 1090 m, 28.VI.2017, 1 ♂; Akdağmadeni, Bulgurlu, 39°48' N, 35°53' E, 1430 m, 28.VI.2017, 2 ♀♀, 1 ♂; Centrum, Özlüce, 39°29' N, 35°03' E, 1060 m, 2.VII.2017, 3 ♀♀, 4 ♂♂; Centrum, Topçu, 39°42' N, 34°50' E, 1155 m, 19.VI.2018, 22 ♀♀, 34 ♂♂; Centrum, Tayıp, 39°50' N, 34°42' E, 1209 m, 19.VI.2018, 2 ♀♀, 5 ♂♂; Centrum, Evci, 39°51' N, 34°42' E, 1192 m, 19.VI.2018, 3 ♀♀, 10 ♂♂; Sorgun, Aşağıkarakaya, 39°49' N, 35°01' E, 1140 m, 23.VI.2018, 2 ♀♀, 6 ♂♂; Sarıkaya, Akbenliçiftliği, 39°29' N, 35°22' E, 1244 m, 23.VI.2018, 17 ♀♀, 22 ♂♂.

Host plants: *Onopordum cynarocephalum*, *Onop. acanthium* (Freidberg and Kugler, 1989; Merz, 1994; Kütük, 2003a).

Tephritis simplex (Loew, 1844)

Specimens examined (Figure 17): Yozgat, Sorgun, Doğankent, 39°41' N, 35°23' E, 1090 m, 28.VI.2017, 1 ♂.

Host plants: *Crepis albida* (Merz, 1994).

Tephritomyia lauta (Loew, 1869)

Specimens examined (Figure 18): Yozgat, Centrum, Evci, 39°51' N, 34°42' E, 1192 m, 19.VI.2018, 1 ♂.

Host plants: *Echinops viscosus* (Freidberg and Kugler, 1989; Kütük, 2003a).

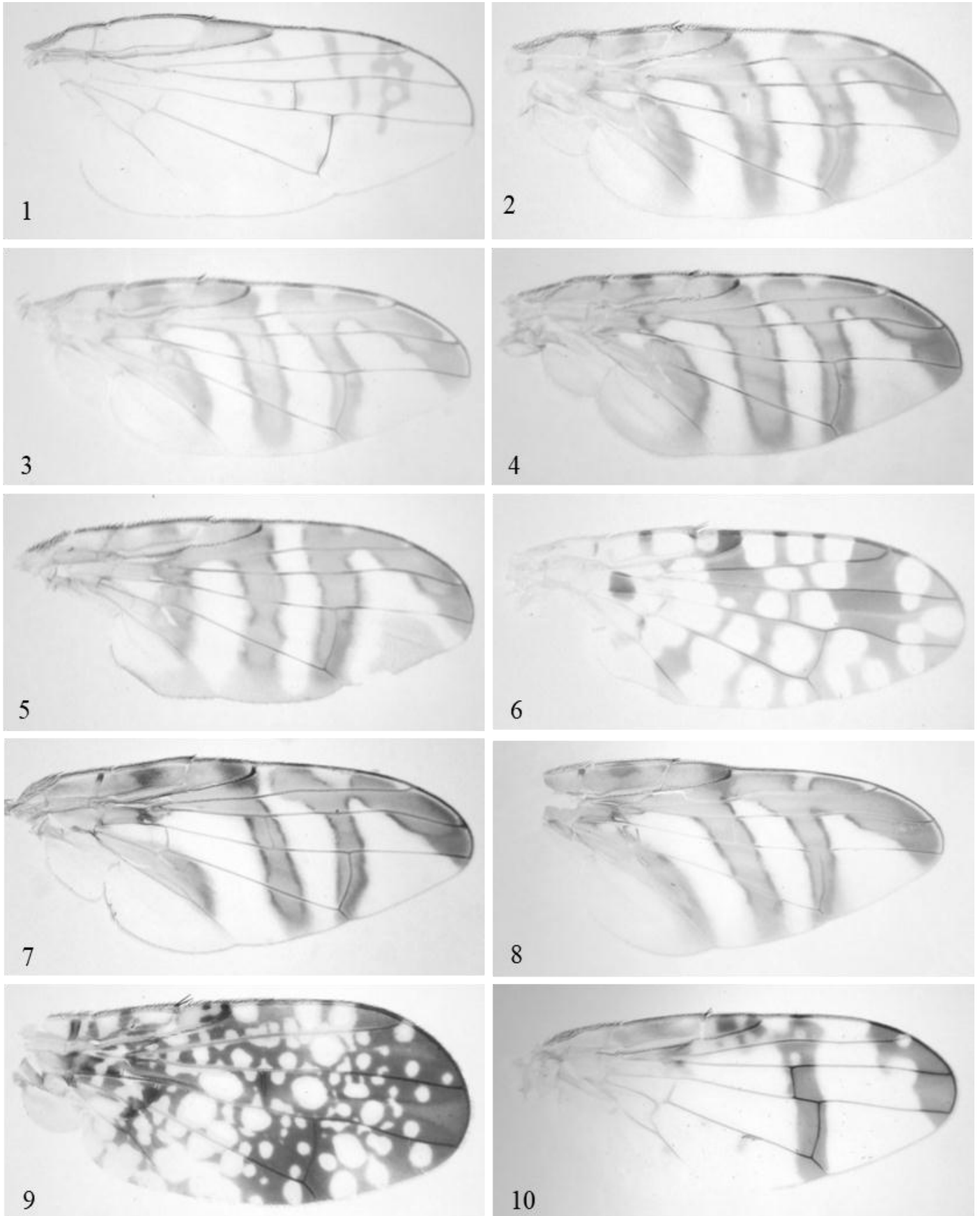


Figure 1-10. Wing figures of fruit flies 1-10: 1- *Acanthiophilus helianthi*, 2- *Chaetorellia jaceae*, 3- *Cha. loricata*, 4- *Cha. succinea*, 5- *Chaetostomella cylindrica*, 6- *Euaresta bullans*, 7- *Orellia falcata*, 8- *Ore. stictica*, 9- *Oxyna flavipennis*, 10- *Sphenella marginata*.

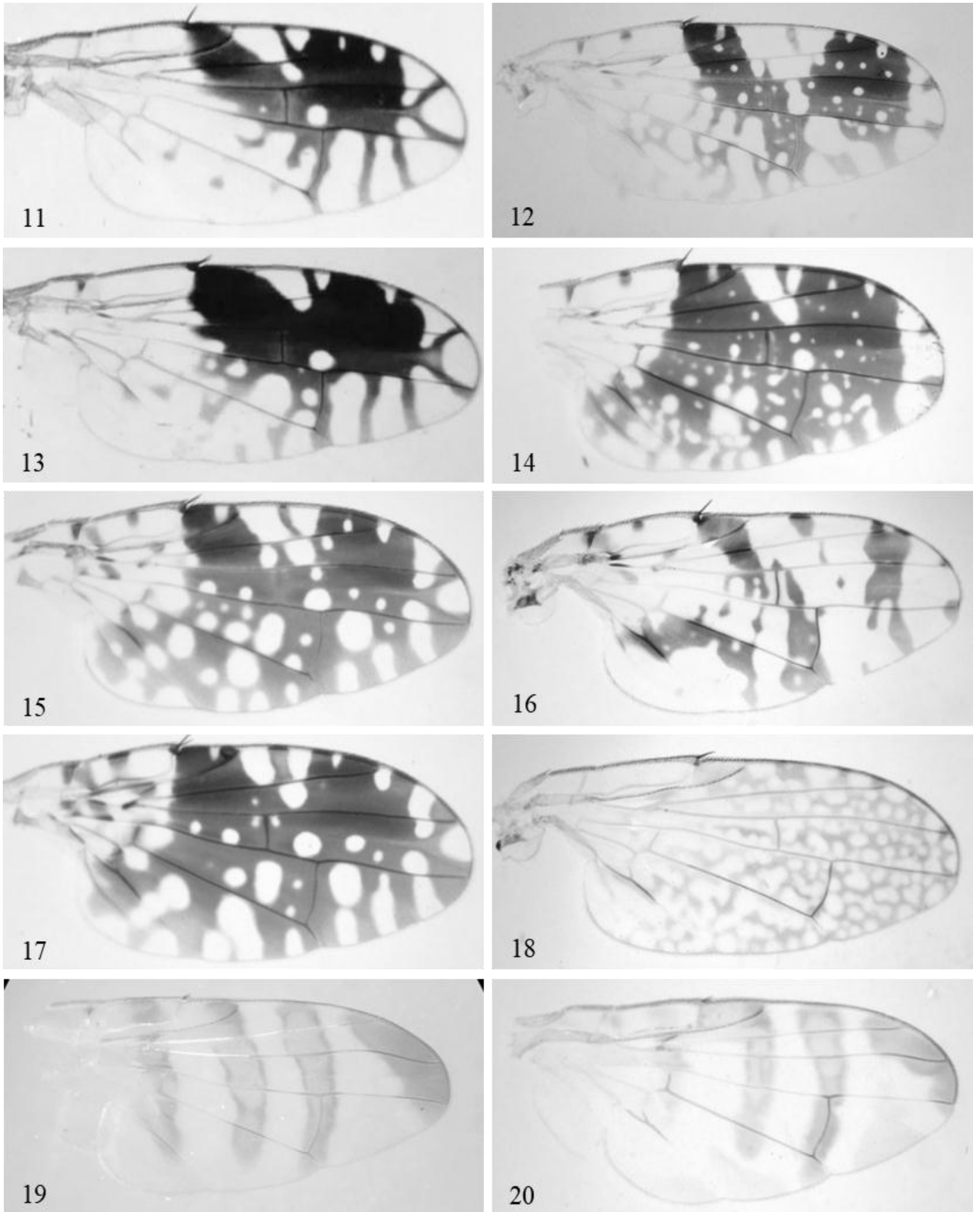


Figure 11-20. Wing figures of fruit flies 11-20: 11- *Tephritis acanthiophilopsis*, 12- *Tep. bardanae*, 13- *Tep. divisa*, 14- *Tep. formosa*, 15- *Tep. matricariae*, 16- *Tep. postica*, 17- *Tep. simplex*, 18- *Tephritomyia lauta*, 19- *Terellia ceratocera*, 20- *Ter. gynaecochoroma*.

Terellia ceratocera (Hendel, 1794)

Specimens examined (Figure 19): Yozgat, Centrum, Tayıp, 39°50' N, 34°42' E, 1209 m, 19.VI.2018, 2 ♂♂. Host plants: *Centaurea alpestris*, *Cent. scabiosa* (White 1988; Merz 1994).

Terellia luteola (Wiedemann, 1830)***Terellia gynaeochroma*** (Hering, 1937)

Specimens examined (Figure 20): Yozgat, Sorgun, Sarıhamzalı, 39°68' N, 35°23' E, 1061 m, 01.VII.2016, 1 ♂; Centrum, Özlüce, 39°29' N, 35°03' E, 1060 m, 2.VII.2017, 2 ♂♂; Centrum, Topçu, 39°42' N, 34°50' E, 1155 m, 19.VI.2018, 9 ♀♀, 15 ♂♂; Centrum, Tayıp, 39°50' N, 34°42' E, 1209 m, 19.VI.2018, 1 ♀, 1 ♂; Centrum, Evcı, 39°51' N, 34°42' E, 1192 m, 19.VI.2018, 4 ♀♀, 1 ♂; Sorgun, Aşağıkarakaya, 39°49' N, 35°01' E, 1140 m, 23.VI.2018, 1 ♂; Sarıkaya, Akbenliçiftliği, 39°29' N, 35°22' E, 1244 m, 23.VI.2018, 3 ♀♀, 2 ♂♂.

Host plants: *Onopordum anisacanthum*, *Onop. illyricum* (Khouzama et al., 2002).

Specimens examined (Figure 21): Yozgat, Sarıkaya, Yeşilkışla, 39°24' N, 35°21' E, 1220 m, 28.VI.2017, 1 ♂; Sarıkaya, Bağlıca, 39°35' N, 35°15' E, 1118 m, 28.VI.2017, 1 ♀; Centrum, Özlüce, 39°29' N, 35°03' E, 1060 m, 2.VII.2017, 2 ♀♀; Centrum, Tayıp, 39°50' N, 34°42' E, 1209 m, 19.VI.2018, 1 ♀, 1 ♂; Sarıkaya, Akbenliçiftliği, 39°29' N, 35°22' E, 1244 m, 23.VI.2018, 1 ♀.

Host plants: *Carthamus syriacum*, *Cart. tenuis*, *Cart. tinctorius*, *Onopordum acanthium* (Khouzama et al., 2002; Kütük and Varol, 2006).

Terellia quadratula (Loew, 1869)

Specimens examined (Figure 22): Yozgat, Centrum, Tayıp, 39°50' N, 34°42' E, 1209 m, 19.VI.2018, 1 ♀.

Host plants: *Echinops viscosus* (Freidberg and Kugler 1989).

Terellia ruficauda (Fabricius, 1794)

Specimens examined (Figure 23): Yozgat, Sorgun, Çayözü, 39°44' N, 35°13' E, 1450 m, 28.VI.2017, 1 ♀, 1 ♂; Sarıkaya, Yeşilkışla, 39°24' N, 35°21' E, 1220 m, 28.VI.2017, 1 ♀, 3 ♂♂; Sorgun, Doğan kent, 39°41' N, 35°23' E, 1090 m, 28.VI.2017, 12 ♀♀, 22 ♂♂; Centrum, Özlüce, 39°29' N, 35°03' E, 1060 m, 2.VII.2017, 1 ♀, 2 ♂♂; Centrum, Topçu, 39°42' N, 34°50' E, 1155 m, 19.VI.2018, 1 ♀, 1 ♂.

Host plants: *Cirsium arvense*, *Circ. dissectum*, *Circ. eriophorum*, *Circ. palustre* (White, 1988; Merz, 1994; Kütük and Özgür, 2003).

Terellia serratulae (Linnaeus, 1758)

Specimens examined (Figure 24): Yozgat, Sorgun, Aşağıkarakaya, 39°81' N, 35°05' E, 1112 m, 27.VI.2016, 1 ♂; Sorgun, Sarıhamzalı, 39°68' N, 35°23' E, 1061 m, 01.VII.2016, 1 ♀, 1 ♂; Boğazlıyan,

Aşağısarıkaya, 39°25' N, 35°06' E, 1159 m, 13.VI.2017, 11 ♀♀, 5 ♂♂; Centrum, Kırıksoku, 39°51' N, 34°42' E, 1350 m, 28.VI.2017, 1 ♂; Sarıkaya, Yeşilkışla, 39°24' N, 35°21' E, 1220 m, 28.VI.2017, 1 ♀, 3 ♂♂; Sarıkaya, Bağlıca, 39°35' N, 35°15' E, 1118 m, 28.VI.2017, 1 ♀, 2 ♂♂; Akdağmadeni, Centrum, 39°42' N, 35°52' E, 1220 m, 28.VI.2017, 5 ♀♀, 6 ♂♂; Centrum, Kalınbük, 39°56' N, 34°41' E, 1181 m, 25.VII.2017, 1 ♀, 1 ♂; Centrum, Topçu, 39°42' N, 34°50' E, 1155 m, 19.VI.2018, 2 ♀♀, 3 ♂♂; Centrum, Tayıp, 39°50' N, 34°42' E, 1209 m, 19.VI.2018, 3 ♀♀, 2 ♂♂; Centrum, Evcı, 39°51' N, 34°42' E, 1192 m, 19.VI.2018, 3 ♀♀, 3 ♂♂; Sorgun, Aşağıkarakaya, 39°49' N, 35°01' E, 1140 m, 23.VI.2018, 4 ♂♂; Sarıkaya, Akbenliçiftliği, 39°29' N, 35°22' E, 1244 m, 23.VI.2018, 3 ♀♀, 1 ♂.

Host plants: *Carduus acanthoides*, *Card. defloratus*, *Card. nutans*, *Centaurea iberica*, *Cirsium arvense*, *Circ. gnaphaloides*, *Circ. phyllocephalum*, *Circ. tuberosum*, *Circ. vulgare*, *Onopordum acanthium*, *Onop. tauricum*, *Picnomon acarna* (White, 1988; Freidberg and Kugler, 1989; Merz, 1994; Kütük, 2003a)

Terellia tussilaginis (Fabricius, 1775)

Specimens examined (Figure 25): Yozgat, Akdağmadeni, Centrum, 39°42' N, 35°52' E, 1220 m, 28.VI.2017, 4 ♀♀, 4 ♂♂.

Host plants: *Arctium lappa*, *Arct. memorosum*, *Arct. minus*, *Arct. tomentosum*, *Cirsium arvense*, *Circ. vulgare* (Merz, 1994).

Terellia virens (Loew, 1846)

Specimens examined (Figure 26): Yozgat, Boğazlıyan, Yapalak, 39°25' N, 35°26' E, 1124 m, 27.VI.2016, 3 ♂♂; Sarıkaya, Boyalık, 39°42' N, 35°41' E, 1218 m, 27.VI.2016, 2 ♂♂; Sorgun, Sarıhamzalı, 39°68' N, 35°23' E, 1061 m, 01.VII.2016, 6 ♀♀, 4 ♂♂; Boğazlıyan, Centrum, 39°16' N, 35°24' E, 1059 m, 01.VII.2016, 1 ♂; Boğazlıyan, Aşağısarıkaya, 39°25' N, 35°06' E, 1159 m, 13.VI.2017, 1 ♀; Centrum, Kırıksoku, 39°51' N, 34°42' E, 1350 m, 28.VI.2017, 1 ♂; Sorgun, Çayözü, 39°44' N, 35°13' E, 1450 m, 28.VI.2017, 1 ♀, 2 ♂♂; Sarıkaya, Yeşilkışla, 39°24' N, 35°21' E, 1220 m, 28.VI.2017, 6 ♀♀, 5 ♂♂; Sarıkaya, Bağlıca, 39°35' N, 35°15' E, 1118 m, 28.VI.2017, 2 ♀♀, 2 ♂♂; Akdağmadeni, Bulgurlu, 39°48' N, 35°53' E, 1430 m, 28.VI.2017, 1 ♀, 1 ♂; Centrum, Özlüce, 39°29' N, 35°03' E, 1060 m, 2.VII.2017, 1 ♂; Centrum, Topçu, 39°42' N, 34°50' E, 1155 m, 19.VI.2018, 1 ♂; Sorgun, Aşağıkarakaya, 39°49' N, 35°01' E, 1140 m, 23.VI.2018, 1 ♀.

Host plants: *Centaurea alba*, *Cent. calcitropa*, *Cent. hyalolepis*, *Cent. iberica*, *Cent. maculosa*, *Cent. pichleri*, *Cent. solstitialis*, *Cent. vallesiaca* (Giray 1979; Freidberg and Kugler 1989; Merz 1994; Kütük and Özgür 2003).

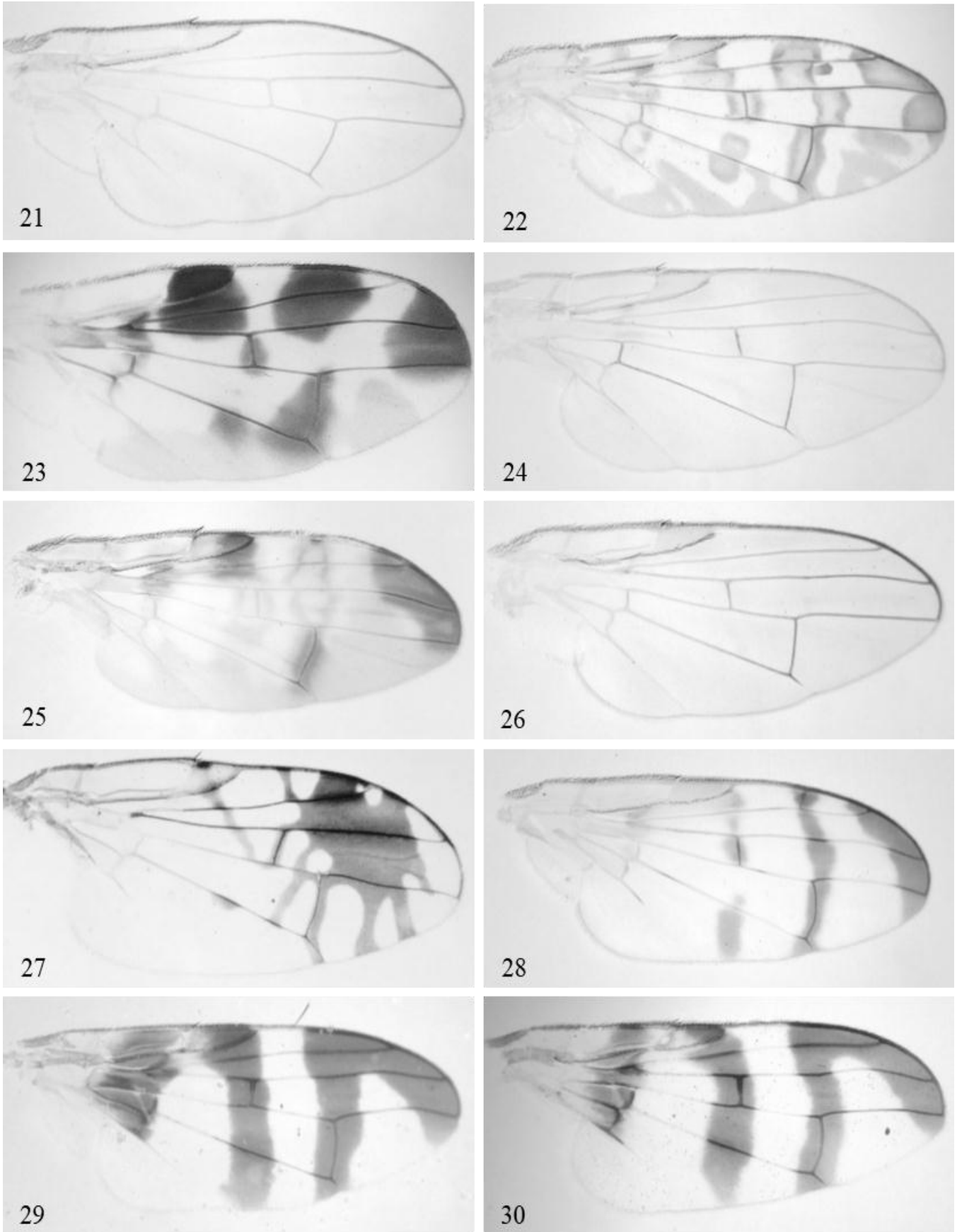


Figure 21-30. Wing figures of fruit flies 21-30: 21- *Terellia luteola*, 22- *Ter. ruficauda*, 23- *Ter. serratulae*, 24- *Ter. quadratula*, 25- *Ter. tussilaginis*, 26- *Ter. virens*, 27- *Trupanea amoena*, 28- *Urophora affinis*, 29- *Uro. aprica*, 30- *Uro. cuspidata*.

Trupanea amoena (Frauenfeld, 1857)

Specimens examined (Figure 27): Yozgat, Sorgun, Aşağıkarakaya, 39°81' N, 35°05' E, 1112 m, 27.VI.2016, 2 ♀♀; Sorgun, Sarıhamzalı, 39°68' N, 35°23' E, 1061 m, 01.VII.2016, 1 ♀, 1 ♂; Sarıkaya, Bağlıca, 39°35' N, 35°15' E, 1118 m, 28.VI.2017, 1 ♀.

Host plants: *Achillea millefolium*, *Carduus nutans*, *Carthamus tinctorius*, *Centaurea iberica*, *Cent. sp.*, *Lactuca sativa*, *Lact. scariola*, *Lact. serriola*, *Launaea nudicaulis*, *Leontodon autumnalis*, *Picris hieracioides*, *Sonchus arvensis*, *Sonc. asper*, *Sonc. oleraceus* (Giray, 1979; Freidberg and Kugler, 1989; Merz, 1994; Kütük, 2003a).

Urophora affinis (Frauenfeld, 1857)

Specimens examined (Figure 28): Yozgat, Boğazlıyan, Yapalak, 39°25' N, 35°26' E, 1124 m, 27.VI.2016, 1 ♂; Sorgun, Aşağıkarakaya, 39°81' N, 35°05' E, 1112 m, 27.VI.2016, 2 ♀♀, 2 ♂♂; Çekerek, Centrum, 40°05' N, 35°51' E, 835 m, 01.VII.2016, 1 ♀, 1 ♂; Sorgun, Sarıhamzalı, 39°68' N, 35°23' E, 1061 m, 01.VII.2016, 2 ♂♂; Boğazlıyan, Centrum, 39°16' N, 35°24' E, 1059 m, 01.VII.2016, 2 ♀♀, 3 ♂♂; Boğazlıyan, Aşağısarıkaya, 39°25' N, 35°06' E, 1159 m, 13.VI.2017, 1 ♂; Sorgun, Doğan kent, 39°41' N, 35°23' E, 1090 m, 28.VI.2017, 1 ♀, 2 ♂♂; Saraykent, Körük, 39°41' N, 35°40' E, 1267 m, 28.VI.2017, 12 ♀♀, 17 ♂♂; Akdağmadeni, Centrum, 39°42' N, 35°52' E, 1220 m, 28.VI.2017, 10 ♀♀, 11 ♂♂; Akdağmadeni, Bulgurlu, 39°48' N, 35°53' E, 1430 m, 28.VI.2017, 67 ♀♀, 69 ♂♂; Centrum, Topçu, 39°42' N, 34°50' E, 1155 m, 19.VI.2018, 2 ♂♂; Centrum, Tayıp, 39°50' N, 34°42' E, 1209 m, 19.VI.2018, 2 ♀♀, 2 ♂♂; Centrum, Evci, 39°51' N, 34°42' E, 1192 m, 19.VI.2018, 2 ♀♀, 13 ♂♂.

Host plants: *Carduus pycnocephalus*, *Centaurea calcitropa*, *Cent. iberica*, *Cent. maculosa* (Giray, 1979; Freidberg and Kugler 1989; Merz, 1994; Kütük, 2003a).

Urophora aprica (Fallen, 1814)

Specimens examined (Figure 29): Yozgat, Sarıkaya, Yeşilkışla, 39°24' N, 35°21' E, 1220 m, 28.VI.2017, 1 ♀.

Host plants: *Centaurea cyanus*, *Cent. iberica*, *Cent. solstitialis* (Merz, 1994; Kütük, 2003b).

Urophora cuspidata (Meigen, 1826)

Specimens examined (Figure 30): Yozgat, Sarıkaya, Yeşilkışla, 39°24' N, 35°21' E, 1220 m, 28.VI.2017, 1 ♀.

Host plants: *Centaurea alpestris*, *Cent. iberica*, *Cent. pichleri*, *Cent. scabiosa*, *Cent. tenuifolia* (White, 1988; Merz, 1994; Kütük, 2003b; Yaran, 2009).

Urophora jaceana (Hering, 1935)

Specimens examined (Figure 31): Yozgat, Çekerek, Centrum, 40°05' N, 35°51' E, 835 m, 01.VII.2016, 3

♀♀, 1 ♂; Boğazlıyan, Aşağısarıkaya, 39°25' N, 35°06' E, 1159 m, 13.VI.2017, 1 ♀; Sarıkaya, Yeşilkışla, 39°24' N, 35°21' E, 1220 m, 28.VI.2017, 8 ♀♀, 2 ♂♂; Sarıkaya, Bağlıca, 39°35' N, 35°15' E, 1118 m, 28.VI.2017, 3 ♀♀, 1 ♂; Sorgun, Aşağıkarakaya, 39°49' N, 35°01' E, 1140 m, 23.VI.2018, 2 ♀♀, 1 ♂; Sarıkaya, Akbenliçiftliği, 39°29' N, 35°22' E, 1244 m, 23.VI.2018, 2 ♀♀.

Host plants: *Centaurea calpitropa*, *Cent. iberica*, *Cent. jaceana*, *Cent. nigra*, *Cent. solstitialis*, *Sesamum indicum* (Giray, 1979; White, 1988; Merz, 1994; Kütük, 2003a).

Urophora mauritanica Macquart 1851

Specimens examined (Figure 32): Yozgat, Sarıkaya, Yeşilkışla, 39°24' N, 35°21' E, 1220 m, 28.VI.2017, 1 ♀, 1 ♂; Akdağmadeni, Centrum, 39°42' N, 35°52' E, 1220 m, 28.VI.2017, 1 ♀; Akdağmadeni, Bulgurlu, 39°48' N, 35°53' E, 1430m, 28.VI.2017, 1 ♂; Sarıkaya, Akbenliçiftliği, 39°29' N, 35°22' E, 1244 m, 23.VI.2018, 1 ♀.

Host plants: *Carthamus arborescens*, *Cart. glaucus*, *Cart. lanatus*, *Cart. tennis*, *Cart. tinctoriu*, (Korneyev and White, 2000).

Urophora phalolepidis Merz – White, 1991

Specimens examined (Figure 33): Yozgat, Sarıkaya, Bağlıca, 39°35' N, 35°15' E, 1118 m, 28.VI.2017, 2 ♂♂. Host plants: *Centaurea alba*, *Cent. iberica*, *Cent. pichleri* (Korneyev, 1999; Kütük, 2003b).

Urophora quadrifasciata (Meigen, 1826)

Specimens examined (Figure 34): Yozgat, Sarıkaya, Yeşilkışla, 39°24' N, 35°21' E, 1220 m, 28.VI.2017, 1 ♀, 1 ♂; Akdağmadeni, Centrum, 39°42' N, 35°52' E, 1220 m, 28.VI.2017, 1 ♀, 1 ♂.

Host plants: *Centaurea calpitropa*, *Cent. cyanus*, *Cent. iberica*, *Cent. jaceana*, *Cent. maculosa*, *Cent. nigra*, *Cent. nigrescens*, *Cent. procurrens*, *Cent. splendens*, *Medicago sativa*, *Serratula tinctoria* (Giray, 1979; White, 1988; Freidberg and Kugler, 1989; Merz, 1994).

Urophora solstitialis (Linnaeus, 1758)

Specimens examined (Figure 35): Yozgat, Sarıkaya, Boyalık, 39°42' N, 35°41' E, 1218 m, 27.VI.2016, 1 ♂; Sorgun, Aşağıkarakaya, 39°81' N, 35°05' E, 1112 m, 27.VI.2016, 1 ♂; Çekerek, Centrum, 40°05' N, 35°51' N, 835 m, 01.VII.2016, 1 ♂; Boğazlıyan, Aşağısarıkaya, 39°25' N, 35°06' E, 1159 m, 13.VI.2017, 2 ♂♂; Sorgun, Çayözü, 39°44' N, 35°13' E, 1450 m, 28.VI.2017, 1 ♂; Sarıkaya, Yeşilkışla, 39°24' N, 35°21' E, 1220 m,

28.VI.2017, 5 ♂♂; Sarıkaya, Bağlıca, 39°35' N, 35°15' E, 1118 m, 28.VI.2017, 1 ♀, 10 ♂♂; Sorgun, Doğan kent, 39°41' N, 35°23' E, 1090 m, 28.VI.2017, Akdağmadeni, Bulgurlu, 39°48' N, 35°53' E, 1430 m, 28.VI.2017, 1 ♂; 1 ♀.

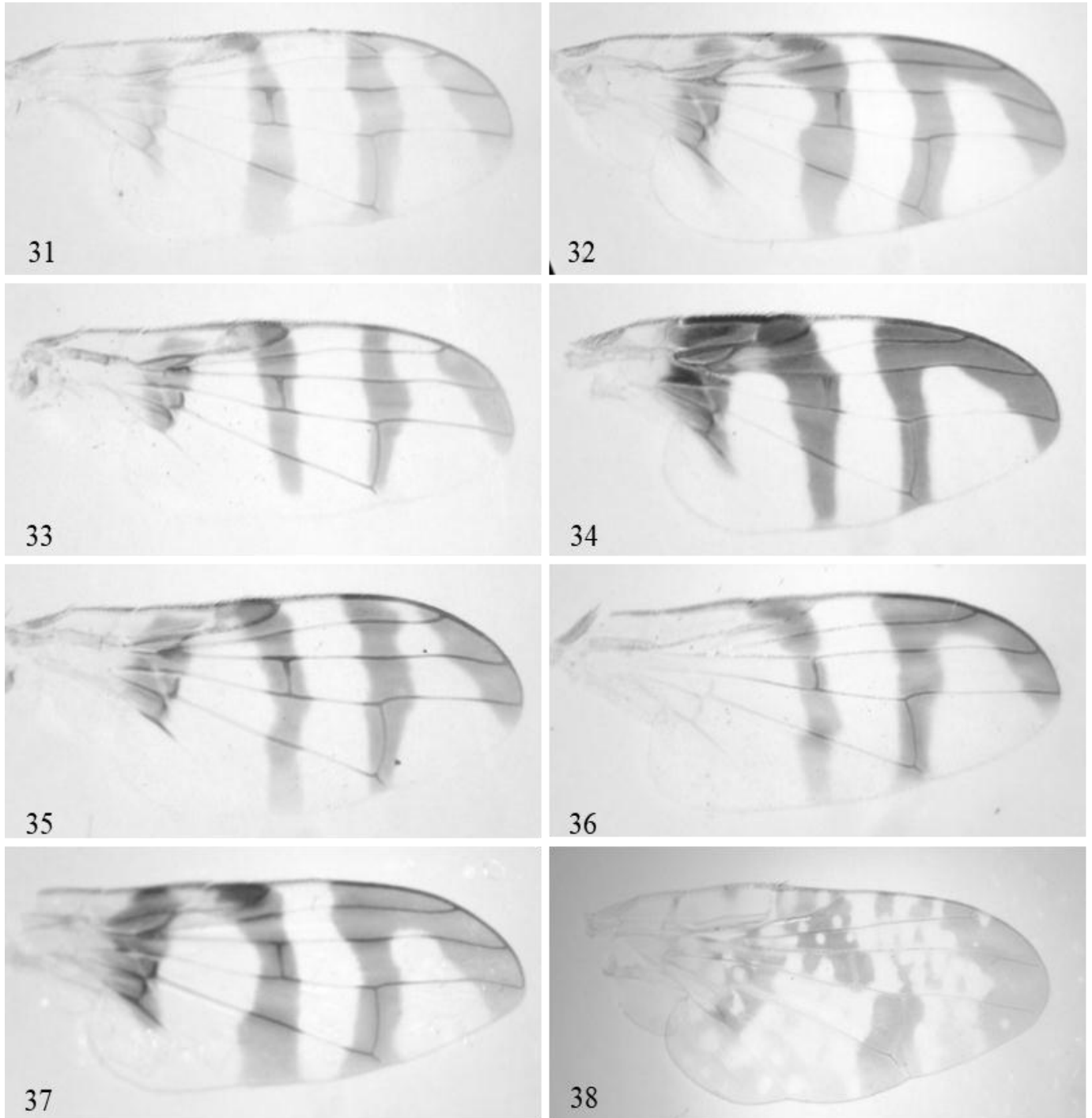


Figure 31-38. Wing figures of fruit flies 31-38: 31- *Urophora jaceana*, 32- *Uro. mauritanica*, 33- *Uro. phalolepidis*, 34- *Uro. quadrifasciata*, 35- *Uro. solstitialis*, 36- *Uro. stylata*, 37- *Uro. terebrans*, 38- *Xyphosia miliaria*.

Host plants: *Carduus anthoides*, *Card. crispus*, *Card. defloratus*, *Card. nutans*, *Card. personata*, *Centaurea iberica*, *Cent. pichleri*, *Cent. solstitialis*, *Cirsium heterophyllum*, *Circ. vulgare* (Giray, 1969; Giray, 1979; White, 1988; Merz, 1994; Kütük, 1998; Kütük, 2003a).

Urophora stylata (Fabricius, 1775)

Specimens examined (Figure 36): Yozgat, Yerköy, Akpınar, 39°41' N, 34°28' E, 753 m, 27.VI.2016, 1 ♂;

Sorgun, Sarıhamzalı, 39°68' N, 35°23' E, 1061 m, 01.VII.2016, 1 ♀; Sorgun, Doğan kent, 39°41' N, 35°23' E, 1090 m, 28.VI.2017, 1 ♂; Akdağmadeni, Centrum, 39°42' N, 35°52' E, 1220 m, 28.VI.2017, 7 ♀♀, 9 ♂♂; Akdağmadeni, Bulğurlu, 39°48' N, 35°53' E, 1430 m, 28.VI.2017, 1 ♀, 2 ♂♂; Centrum, Büyükcincirli, 39°37' N, 34°55' E, 1028 m, 19.VI.2018, 1 ♀, 1 ♂; Centrum, Topçu, 39°42' N, 34°50' E, 1155 m, 19.VI.2018, 1 ♀, 3 ♂♂.

Host plants: *Carduus nutans*, *Centaurea iberica*, *Cirsium arvense*, *Circ. eriophorum*, *Circ. gaillardoti*, *Circ. phyllocephalum*, *Circ. vulgare*, *Xanthium spinosum* (Giray, 1969; Giray, 1979; White, 1988; Freidberg and Kugler, 1989; Merz, 1994; Kütük, 2003a).

Urophora terebrans (Loew, 1850)

Specimens examined (Figure 37): Yozgat, Sarıkaya, Boyalık, 39°42' N, 35°41' E, 1218 m, 27.VI.2016, 1 ♂; Sarıkaya, Bağlıca, 39°35' N, 35°15' E, 1118 m, 28.VI.2017, 1 ♀, 1 ♂.

Host plants: *Carlina vulgaris*, *Centaurea iberica*, *Cent. solstitialis*, *Cirsium eriophorum*, *Circ. vulgare*, *Onopordum acanthium* (Merz, 1994; Kütük, 2003b).

Xyphosia miliaria (Schrank, 1781)

Specimens examined (Figure 38): Yozgat, Centrum, Topçu, 39°42' N, 34°50' E, 1155 m, 19.VI.2018, 1 ♂; Centrum, Tayıp, 39°50' N, 34°42' E, 1209 m, 19.VI.2018, 1 ♂.

Host plants: *Carduus acanthoides*, *Card. defloratus*, *Card. nutans*, *Cirsium arvense*, *Circ. crispus*, *Circ. eriophorum*, *Circ. eristhaletes*, *Circ. oleraceum*, *Circ. palustre*, *Circ. vulgare*, *Onopordum tauricum* (Merz, 1994; Kütük, 2003a).

ACKNOWLEDGEMENT

We thank to Gaziantep Scientific Research Projects Department (BAP) for their support (Project Number: FEF YLT.17.07)

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