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Diversity of Drosophilidae (Diptera) in Strawberry Orchards:Discovery of some new species in Konya, Türkiye

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Abstract: Drosophilidae, a diverse and widespread fly family, has recently received increasing attention due to the proliferation of its agricultural pest species, especially in fruit-growing regions. This study aimed to assess the diversity of Drosophilidae in strawberry fields within the Konya province from April to December 2022. A total of 10 species belonging to 4 genera (*Drosophila* Fallén, *Hirtodrosophila* Duda, *Zaprionus* Coquillett, *Phortica* Schiner) were identified in the Drosophilidae family. This study reported the presence of *Drosophila busckii* Coquillett, *Drosophila hydei* (Sturtevant), *Drosophila obscura* (Fallén), *Drosophila subobscura* (Collin), *Drosophila simulans* (Sturtevant), *Drosophila suzukii* (Matsumura), *Hirtodrosophila cameraria* (Haliday), *Phortica variegata* (Fallén) and *Zaprionus indianus* (Gupta) in Konya (Türkiye) for the first time. Additionally, *Drosophila obscura, Drosophila simulans, Hirtodrosophila cameraria* and *Phortica variegata* were determined for the first time in Türkiye's strawberry fields.

Keywords: *Drosophila*, Drosophilidae, Strawberry, Vinegar fly, *Zaprionus*

Çilek Bahçelerinde Drosophilidae Çeşitliliği: Konya'da (Türkiye) Bazı Yeni Türlerin Keşfi

Öz: Drosophilidae, çok çeşitli ve yaygın bir sinek familyasıdır. Özellikle meyve yetiştiriciliği yapılan bölgelerde tarımsal zararlı türlerinin çoğalması nedeniyle son zamanlarda artan bir ilgi görmüştür. Bu çalışmada, Nisan-Aralık 2022 tarihleri arasında Konya ili çilek tarlalarında bulunan Drosophilidae tür çeşitliliğininin belirlenmesi amaçlanmıştır. Drosophilidae familyasında 4 cinse (*Drosophila* Fallén, *Hirtodrosophila* Duda, *Zaprionus* Coquillett, *Phortica* Schiner) ait toplam 10 tür tespit edilmiştir. Bu çalışma, *Drosophila busckii* Coquillett, *Drosophila hydei* (Sturtevant), *Drosophila obscura* (Fallén), *Drosophila subobscura* (Collin), Drosophila simulans (Sturtevant), *Drosophila suzukii* (Matsumura), *Hirtodrosophila cameraria* (Haliday), *Phortica variegata* (Fallén) ve *Zaprionus indianus* (Gupta) türlerinin Konya'da (Türkiye) ilk kez tespit edildiğini rapor etmektedir. Ayrıca *Drosophila obscura*, *Drosophila simulans, Hirtodrosophila cameraria* ve *Phortica variegata* Türkiye'deki çilek tarlalarında ilk kez belirlenmiştir.

Anahtar kelimeler: *Drosophila*, Drosophilidae, Çilek, Sirke sineği, *Zaprionus*

1. Introduction

Strawberry, which can be grown economically in different climate and soil conditions, has become increasingly important in the world and in Türkiye. China, Mexico, the United States of America (USA), Spain and Türkiye are the countries with the highest strawberry production (Simpson, 2018). In recent years, Konya has emerged as the fourth-largest strawberry producer in Türkiye, owing to the surge in strawberry cultivation (Anonymous, 2022). The long strawberry production season and the fact that it can be grown at different altitudes provide different environments for pests to cause problems. One of these problems is *Drosophila* species (Drosophilidae: Diptera), which have spread in many countries in recent years and threaten fruit production in places where they are infected. Most *Drosophila* lay eggs in decaying organic matter materials such as compost, rotting produce; others grow in living or decaying fungi, in the slime or sap of trees or flowering plants (Bächli et al., 2004; O'Grady & Markow, 2009). Some species, such as *Drosophila suzukii* (Matsumura), also lay eggs in healthy unripe fruit (Fartyal et al., 2014). Due to the high reproductive potential of *Drosophila* species, their populations can increase rapidly. The Drosophilidae family, commonly known as vinegar or small fruit flies, comprises 73 extant genera and 3 extinct genera, over 3950 species Drosophilidae. It has mainly two subfamilies Drosophilinae (~3500 species) and Steganinae (~700 species) (Brake & Baechli, 2008; NCBI, 2023). While numerous species within the Drosophilinae subfamily (43 genera), the Steganinae subfamily (30 genera) still lacks comprehensive understanding. The genus *Drosophila* contains more

than half of the family, with about 2000 species (O'Grady & DeSalle, 2018). The last published species catalog of the *Drosophila* family in Türkiye lists 36 species (Koçak & Kemal, 2013). However, the online TaxoDros database (http://www.taxodros.uzh.ch/) currently documents 52 species of Drosophilidae (Taxodros, 2023). There are probably more undescribed species waiting to be discovered in Türkiye. The majority of *Drosophila* species have been ignored because they are known to be saprophytic, but in recent years, studies have accelerated in Türkiye with the identification of invasive species that can cause damage to fruits (Başpınar et al., 2022; Çatal et al., 2021; Efil, 2018; Ögür et al., 2018; Zengin, 2020). There is a record of the existence of *Drosophila melanogaster* (Beyşehir district) (Özsoy, 2007) and *Drosophila pallida* (Cihanbeyli and Sille district) (Máca, 1999) species in Konya. Also, the presence of *D. suzukii* in Karaman, Central Anatolia has been reported (Ögür et al., 2018). However, no studies have been conducted in Konya other than these records.

Relying on morphological characteristics for taxonomic identification proves to be an efficient method for recognizing numerous drosophilid species. (Yuzuki & Tidon, 2020). However, accessible identification tools for non-experts remain scarce in this field. We provide photographic descriptions of 10 species recorded in Türkiye to make up for this deficiency.

Since information on Drosophilidae in Konya (Turkey) is very limited, this study aimed to investigate their presence and diversity. Through comprehensive morphological characterization and detailed photography, ten drosophilid species were identified and introduced. Notably, nine of these species represent new records for Konya, Türkiye. Additionally, due to the identification of discrepancies in species names and reference errors in the TaxoDros online database, a revised checklist of *Drosophila* species in Türkiye is presented.

2. Material and Methods

The study was conducted between April and November 2022 in Derbent (38° 06' 88" S, 32˚57′55″ W), Konya, Türkiye. *Drosophila* adults were collected using apple cider vinegar traps from the strawberry fruit samples. A trap was fashioned using a sturdy 500 ml plastic bottle, baited with 100 ml of apple cider vinegar. Eight holes with a diameter of 5 mm were drilled in the top of the bottle to facilitate the entry of the attracted flies. The traps were suspended on garden stakes positioned at an angle near the edges of elevated strawberry beds, with three traps allocated per strawberry garden. They were positioned in a manner where the trap's bottom hung slightly below the top of the strawberry leaves (Renkema et al., 2018). The traps were changed regularly weekly. The collected *Drosophila* species were identified by us based on the morphological criteria described by Bächli et al. (2004), Markow & O'Grady (2006) and Miller et al. (2017) and are deposited in the Department of Plant Protection, Faculty of Agriculture, Selçuk University, Konya, Türkiye.

3. Results and Discussion

1. *Drosophila busckii* Coquillett, 1901

The *busckii* species typically display longitudinally striped pleurae and lack preapical setae on the second and third tibiae (Markow & O'Grady, 2006). The scutum appears yellowish with three distinct dark stripes, the median of which forks in its posterior half (Figure 3). Additionally, the pleura is yellowish and bears two prominent dark horizontal markings (Figure 3). The eyes are round and broader than long (Figure 2). The abdominal tergites are yellowish, each adorned with approximately four more or less isolated dark spots (Figure 1). These are slender flies belonging to the subgenus *Dorsilopha* (Bächli et al., 2004). The *busckii* has transparent wings with no markings (Figure 4) (Miller et al., 2017).

Kocatepe (2019) reported that *D. busckii* was detected in Strawberry orchards in Marmaris (western Türkiye). The same author reported that *D.suzukii* damages and prefers fresh fruits, while *D. busckii* damages rotten fruits.

3.1. *Drosophila hydei* Sturtevant, 1921

This particular species might be sizable and dark but deviates from the previously described characteristics (Figure 5). The mesonotum lacks a bluish hue in its ground color. The frons shows a distinct V-shaped pattern of setae, differing from the previous descriptions. Additionally, the coxae of the forelegs share a similar color with the rest of the leg. The lateral areas of abdominal segments are almost entirely covered by extensions of apical bands, displaying a uniform color without interruptions or lighter regions (Figure 5). The arista features three branches above, excluding the terminal fork (Figure 7). Wing crossveins in this species lack clouding (Figure 8). The mesonotum appears grayish and distinctly spotted, while the second oral vein is either absent or approximately half the length of the

first (Markow & O'Grady, 2006). *Drosophila hydei* can be further identified by the presence of prominent fine setae on the inner side of the fore tarsus (Figure 6). Additionally, the apex of the first costal wing section is typically pale in this species (Bächli et al., 2004).

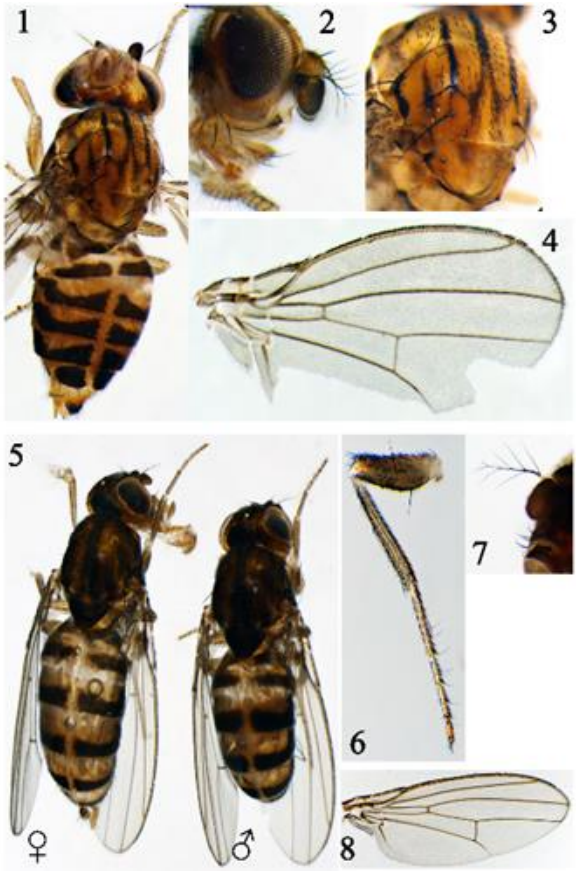

Figure 1-8. Characters of *Drosophila busckii* 1–4: (1) female body, (2) female eyes, (3) female thorax, (4) female wing. Characters of *Drosophila hydei* 5-8: (5) female and male body, (6) male foreleg, (7) male arista, (8) male wing

Şekil 1-8. *Drosophila busckii' nin karakterleri 1–4: (1) dişinin vücudu, (2) dişide gözler, (3) dişide toraks, (4) dişide kanat. Drosophila hydei' nin karakterleri 5–8: (5) dişi ve erkek vücudu, (6) erkekte ön bacak, (7) erkek arista, (8) erkekte kanat.*

3.2. *Drosophila obscura* Fallén, 1823

The *obscura* is dark-colored flies (Figure 9). The acrostichal setulae are organized in eight rows, and sex combs are evident on the first and second tarsal segments (Figure 10-12). The basitarsus notably exceeds the length of the second tarsal segment, and the sex combs themselves are comparatively shorter (Figure 12). The apical of the aedeagus is slender, roundish and the paraphyses are broadened (Figure 11) (Markow & O'Grady, 2006). The outer paraphysis is broad and does not taper towards the tip; instead, it has a distinctly blunt tip (Figure 11) (Bächli et al., 2004).

3.3. *Drosophila subobscura* Collin, 1936

Acrostichal setulae are arranged in eight rows; the proximal sex comb typically has more than ten teeth, while the distal sex comb varies between nine to thirteen teeth. Moreover, the first tarsomere equals the length of the second tarsal segment (Figure 14-15). Both the pleura and abdomen exhibit an overall dark coloration (Figure 13), and the wings display a faint darkening along the costal fringe (Figure 18).

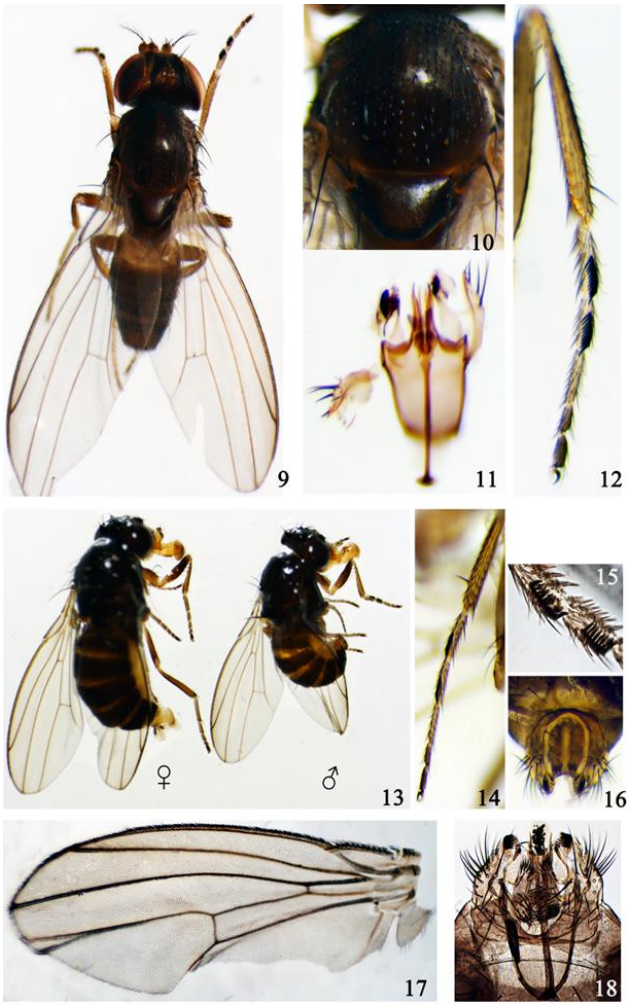

Figure 9–18. Characters of *Drosophila obscura* 9–12: (9) male body, (10) thorax, (11) aedeagus, (12) foreleg. Characters of *Drosophila subobscura* 13–18: (13) female and male body, (14) male foreleg, (15) male sex comb, (16) male cercus, (17) male wing, (18) male ventral view of cercus

Şekil 9-18. *Drosophila obscura' nın karakterleri 9–12: (9) erkek vücudu, (10) toraks, (11) erkek genital organ, (12) ön bacak. Drosophila subobscura' nın karakterleri 13–18: (13) dişi ve erkek vücudu, (14) erkek ön bacak, (15) erkek seks tarağı, (16) erkekte sersi, (17) erkekte kanat, (18) erkekte sersinin alttan görünümü.*

On the ventral margin of the cercus, there's a cluster of short, dense setulae (Figure 16-17). The external process of the epandrium is rounded and bulging at the

base, extending into a thin projection. Additionally, the surstylus is substantial and cup-shaped, laterally compressed, housing a very short, square-like comb containing six to eight setae (Markow & O'Grady, 2006).

3.4. *Drosophila melanogaster* Meigen, 1830

The *melanogaster*'s sex combs are exclusively located on the basitarsus (Figure 20). There are no hooked setae on the mid-leg of males, and only primary claspers are observable. The aedeagus exhibits lateral expansions, the epandrium has a posterior expansion, and the anal plates lack both ventral processes and teeth (Figure 22). The epandrial expansion is broader than it is long. The expansion on the epandrium is trapezoidal in shape (Markow & O'Grady, 2006). In both males and females, the gena is relatively broad, approximately 1/10 of the diameter of the large eye (Figure 19). In male specimens, the dorsal branch of the ventral epandrial lobe appears small, nearly triangular in shape, and exhibits a pale coloration when observed laterally (Bächli et al., 2004). The arista first ventral branch has small ray but excluding terminal fork (Figure 21).

Kocatepe (2019) reported that *D. melanogaster* was detected in Strawberry orchards in Marmaris (western Türkiye).

3.5. *Drosophila simulans* Sturtevant, 1919

The *simulans'* sex combs are found only on the basitarsus (Figure 24). On the mid-leg of the male, there are no hooked setae. Solely primary claspers are observable in this region. The aedeagus displays lateral expansions, the epandrium exhibits a posterior expansion, and the anal plates lack both ventral processes and teeth (Figure 26 and 27). The epandrial expansion is wider than long. The expansion on the epandrium is substantial, semicircular, and distinctly visible from a lateral perspective (Markow & O'Grady, 2006). The gena appears relatively narrow, roughly 1/20 the diameter of the large eye (Figure 23). In males, the dorsal branch of the ventral epandrial lobe is notably large, rounded in shape, and presents an amber hue when observed laterally (Bächli et al., 2004). The arista first ventral branch has not small ray but has terminal fork (Figure 25).

3.6. *Drosophila suzukii* (Matsumura, 1931)

In *suzukii* males, tergites 2-4 are pale yellow with narrow, unbroken dark posterior bands, while tergites 5 and 6 are entirely darkened (Figure 28). Females have pale yellow tergites with narrow, unbroken dark

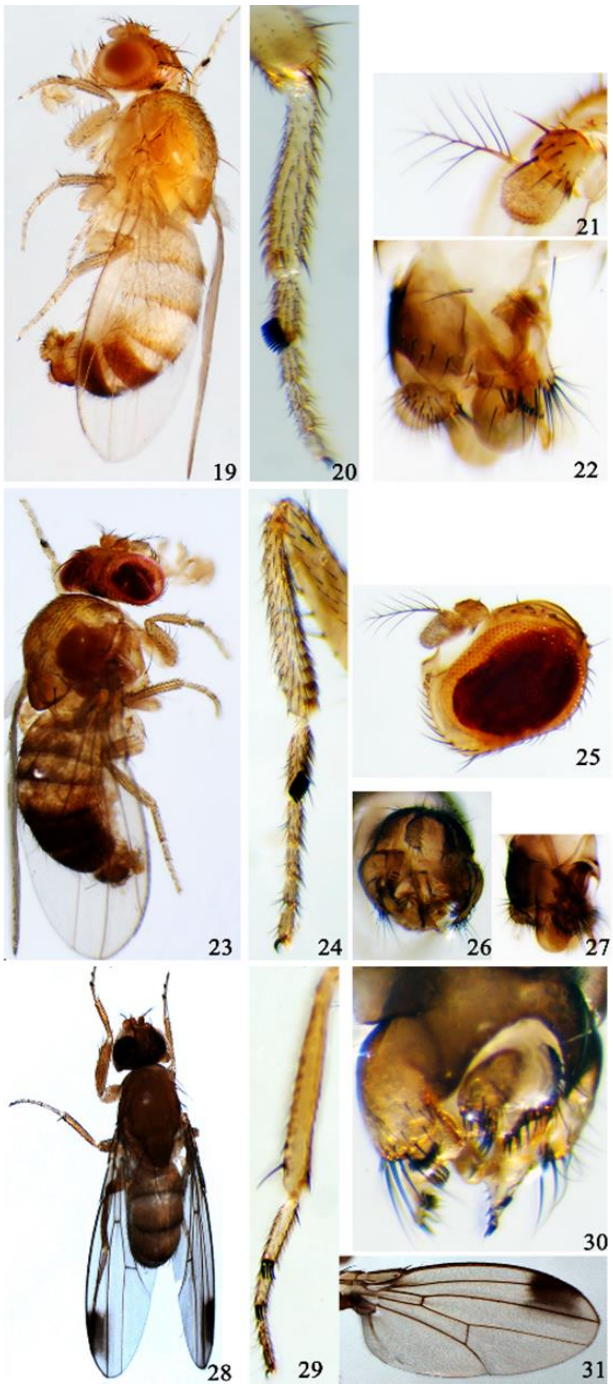

Figure 19–31. Characters of *Drosophila melanogaster* (19–22): (19) male body, (20) male fore tarsus, (21) male arista, (22) male cerci. Characters of *Drosophila simulans* (23–27): (23) male body, (24) male fore tarsus, (25) male arista, (26–27) male cerci. Characters of *Drosophila suzukii* (28–31): (28) male body, (29) male fore tarsus, (30) male cerci, (31) male wing.

Şekil 19-31. *Drosophila melanogaster' in karakterleri (19–22): (19) erkek vücudu, (20) erkekte ön tarsus, (21) erkekte arista, (22) erkekte sersi.Drosophila simulans'ın karakterleri (23–27): (23) erkek vücudu, (24) erkek ön tarsus, (25) erkek arista, (26–27) erkek cercus.Drosophila suzukii'nin karakterleri (28–31): (28) erkek vücut, (29) erkekte tarsus, (30) erkekte sersi, (31) erkekte kanat.*

posterior bands. Males do not possess a dorsal branch of the epandrial ventral lobe (Figure 30). The male fore tarsus features a comb on the first and second fore tarsomeres, with the comb on the first fore tarsomere composed of 4-6 teeth, and the comb on the second fore tarsomere composed of 2-3 teeth (Figure 29). Male wings commonly display infuscation at the apices of wing veins R_{4+5} and R_{2+3}, though sometimes this feature may be absent (Figure 31) (Miller et al., 2017).

Drosophila suzukii was detected for the first time in our country in strawberry fruit in Erzurum (eastern Türkiye) in 2014 (Orhan et al. 2016). Then, in 2019, it was reported that it was detected in Marmaris (western Türkiye) and was harmful throughout the entire fruit season from fruit formation to the end of harvest (Kocatepe, 2019).

3.7. *Hirtodrosophila cameraria* (Haliday, 1833)

The description you provided from Bächli et al. (2004) regarding the diagnosis of *H. cameraria* species (Figure 32) is as follows: The mesonotum showcases a wide, diffuse dark brown median stripe (Figure 33).

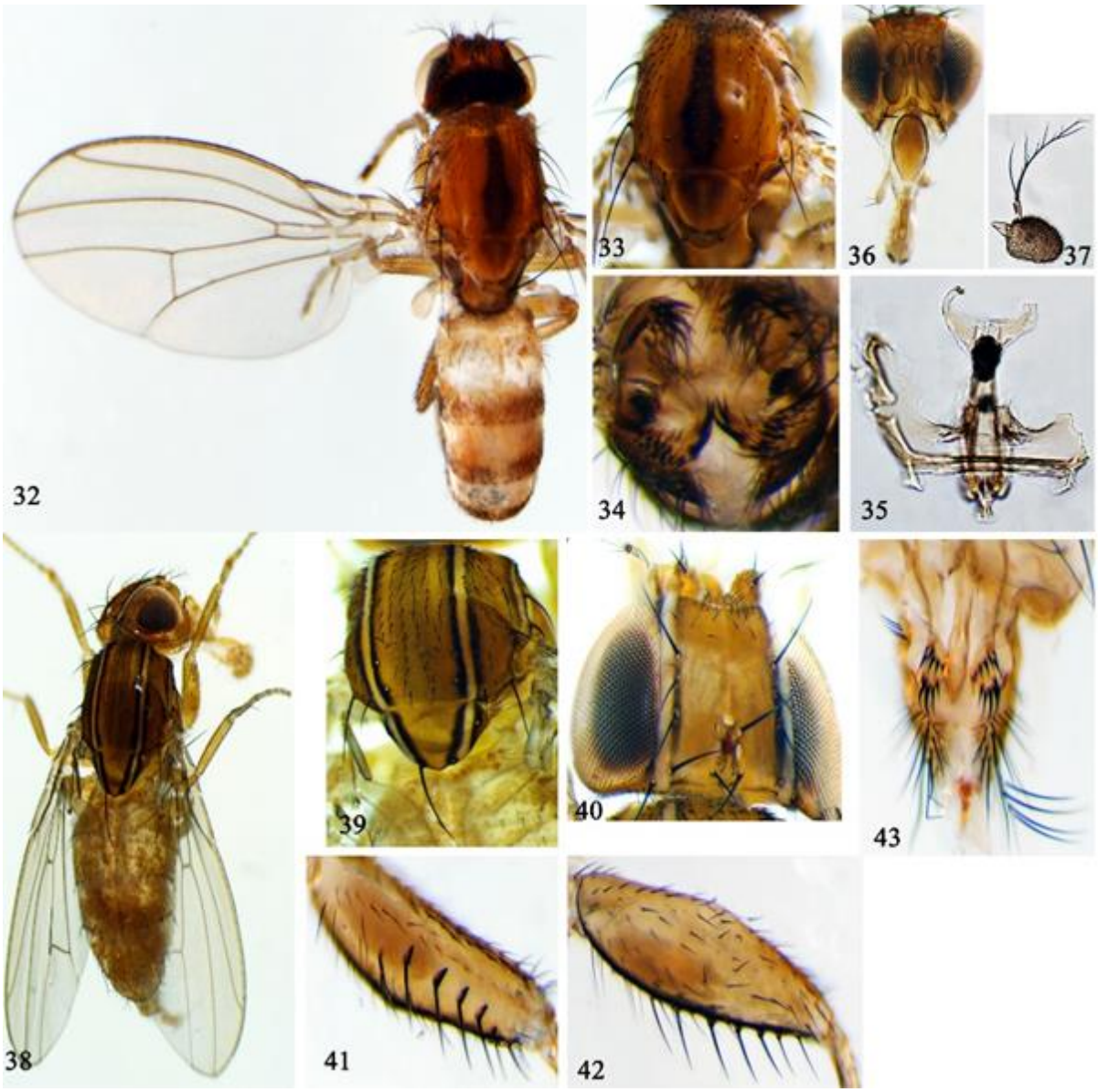

Figure 32–43. Characters of *Hirtodrosophila cameraria* (32–35): (32) male body, (33) male metanotum, (34) male cerci, (35) male aedeagus, (36) male carina, (37) male arista. Characters of *Zaprionus indianus* (38–43): (38) male body, (39) male metanotum, (40) male head, (41–42) male fore femur, (43) male cerci.

Şekil 32-43. *Hirtodrosophila cameraria'nın karakterleri (32–37): (32) erkek vücudu, (33) erkekte metanotum, (34) erkekte sersi, (35) erkek genital organ, (36) erkekte carina, (37) erkekte arista. Zaprionus indianus'un karakterleri (38–43): (38) erkek vücudu, (39) erkekte metanotum, (40) erkekte baş, (41–42) erkekte ön femur, (43) erkekte sersi.*

The cercus displays lateral ventral expansion and features a row of approximately 15 peg-like setae, more prominent at the inner corner (Figure 34). The aedeagus bifurcates apically into two horn-shaped branches, long, slender, scaly, curving dorsally in lateral view and inward in posterior view (Figure 35). The carina appears narrow and relatively small (Figure 36). Antennae exhibit a yellowish hue, with the first flagellomere displaying a diffuse brownish margin. Notably, it features a short lower branch positioned just behind the terminal fork, approximately five relatively long inner branches, and a small terminal fork (Figure 37).

3.8.*Zaprionus indianus* Gupta, 1970

Commonly known as the 'African fig fly,' it belongs to the armatus group in the *Zaprionus* genus and is originally from the African tropics (Gupta, 1970). The fore femur is characterized by a row of approximately five strong setae, each of which is positioned adjacent to and divergent with a stiff setula (Figure 41 and 42). These setae and setula arise from a small tubercle (Bächli et al., 2004). There's a faint, almost transparent dark stripe noticeable along the apical margin of tergites 2-5. Additionally, the sub-apical setae on tergites 4-5 emerge from a dark spot (Figure 39) (Castrezana, 2007). The aedeagus flap is exceptionally smooth at the tip, and the oviscape features six peg-like ovi sensilla (Figure 43) (Yassin & David, 2010).

3.9. *Phortica variegata* (Fallén, 1823)

The homotypic synonym of *Phortica variegata* species is *Amiota variegata*, identified as *Drosophila variegata* according to NCBI (2023). Each antenna arista exhibited between three to six short dorsal branches, gradually decreasing in length towards the tip (Figure 46). The eyes were red in color, encircled by a pale white ring (Figure 47). The scutum showcased a pattern of merging dark spots (Figure 48). Additionally, there was an extra cross-vein separating the discal and second basal wing cells (arrow), a distinctive trait of Drosophilidae, along with two interruptions of the costal vein. The abdomen displayed a yellow and brown design, featuring three transversal bands and one longitudinal dark band against a lighter background (Figure 44–45). Meanwhile, the legs presented three distinct dark bands encircling the tibia. The coxae and femur appeared dark in color, with the latter displaying a lighter base and apex. The female final tergite is conical with an epiproct covered in several short hairs, and the cerci, which are non-sclerotized and hairy, converge at the base (Figure 49) (Otranto et al., 2006).

Although there are studies conducted in fruit orchards such as cherry and peach in Türkiye, research related to strawberries is extremely limited. *Drosophila suzukii* was first determined on strawberry orchards in Erzurum (Türkiye) by Orhan et al. (2016). Kocatepe (2019) were determined *Drosophila suzukii, Drosophila melanogaster* and *Drosophila busckii* species in the strawberry orchards of Marmaris (Muğla-Türkiye). It was determined that among these species, *D. suzukii* was harmful throughout the entire fruit season, from the formation of the fruits until the end of the harvest. The other species, namely *D. melanogaster* and *D. busckii*, were found to be pests in ripened and rotting fruits damaged by *D. suzukii*. The predominant focus on *D. suzukii* among investigations into Drosophilidae species in strawberry fruit can be attributed to its classification as an agricultural pest (Goodhue et al., 2011; Dean et al., 2013; Gong et al., 2016; Bernardi et al., 2017; Efil, 2018; Živković et al.,2019; Baena et al., 2022). To further elucidate the Drosophilidae fauna associated with strawberries, the present study undertook a comprehensive examination of Drosophilidae species in strawberry fruit.

The gena, located on the lower margin of the eye or cheeks, and its width in proportion to the eye, is at times used to distinguish closely related species like *Drosophila melanogaster* and *D. simulans*. In *D. simulans*, the expansion on the epandrium is notably large, semicircular, and clearly visible from a lateral perspective, while in *D. melanogaster*, it tends to assume a trapezoidal shape. (Markow & O'Grady, 2006). While *D. melanogaster* has been previously reported in Konya (Özsoy, 2007), this study provides the first record of the other nine Drosophilidae species identified Konya.

Drosophila obscura can be distinguished from *D. bifasciata* Pomini by the characteristics you mentioned. In *D. obscura*, the outer paraphysis is broad and has a blunt tip, and the aedeagus has a roundish tip. These differences in the outer paraphysis and aedeagus tip are key distinguishing features between the two species. Moreover, in *D. obscura*, tergites 2-3 commonly display a small pale area at the lateroventral corners. The oviscapt valve might also possess distinct characteristics aiding in its differentiation from other species (Bächli et al., 2004).

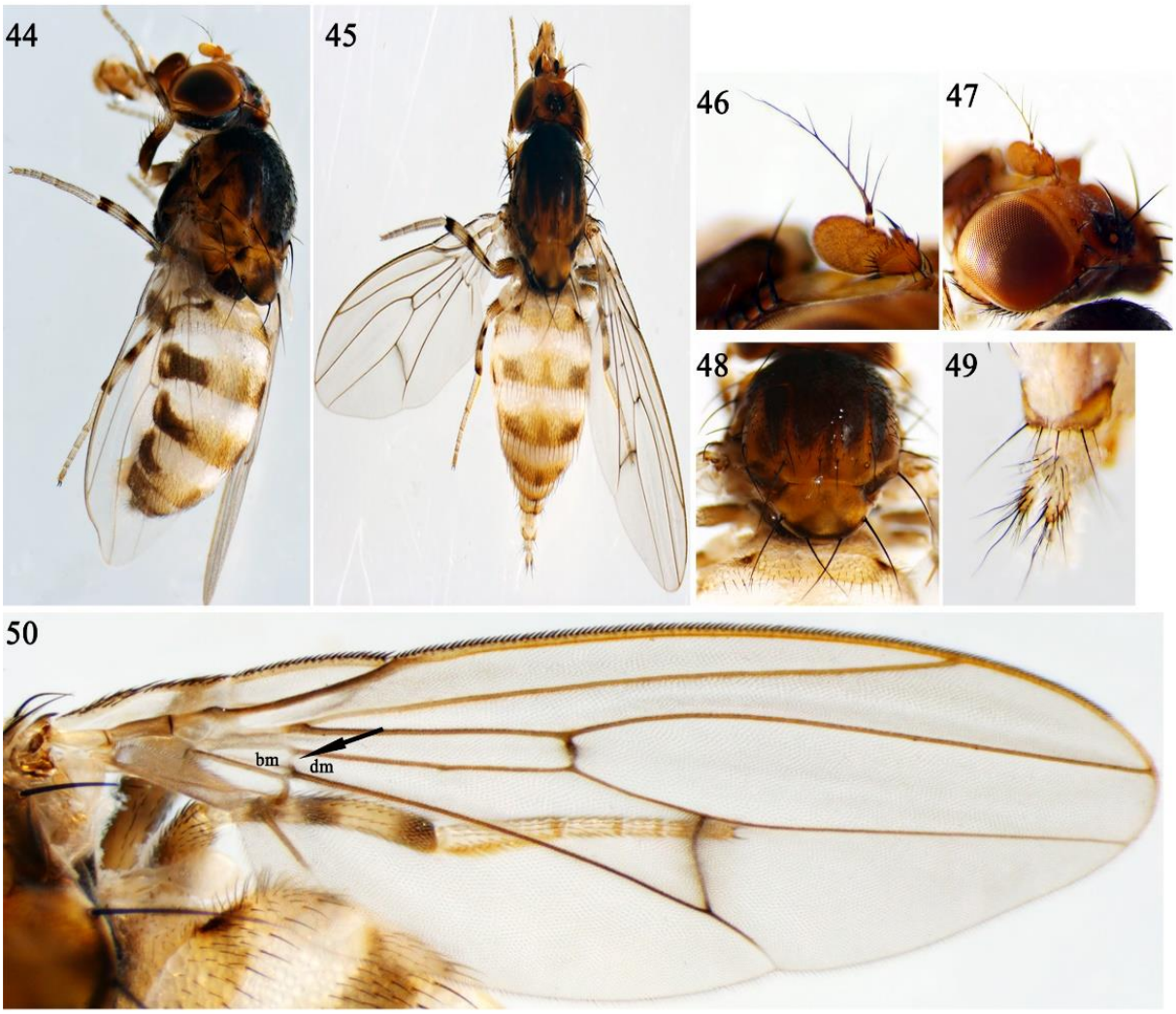

Figure 44–50. Characters of *Phortica variegata* (44–50): (44) male body, (45) female body, (46) male carina, (47) a pale white ring of male eyes, (48) male metanotum, (49) female terminalia organ, (50) male wing.
Şekil 44-50. *Phortica variegata'nın karakterleri (44–50): (44) erkek vücudu, (45) dişi vücudu, (46) erkekte carina, (47) erkekte gözler cevresinde soluk beyaz halka, (48) erkekte metanotum, (49) dişi terminal organ, (50) erkekte kanat.*

The list of species belonging to the Drosophilidae family in Türkiye is presented as 36 species by (Koçak & Kemal, 2013). The online TaxoDros database now lists 52 species of Drosophilidae (Taxodros, 2023). In addition, it appears that some species names published in the TaxoDros online database contain errors and some are given repeatedly. Consequently, this study necessitated the meticulous verification and correction of these discrepancies, leading to the compilation of a comprehensive checklist of Drosophilidae species in Türkiye.

4. Conclusion

Konya has become a very important location for strawberry cultivation in recent years. This study was to determine the *Drosophila* species that cause data loss in fruits. This is the first report on the occurrence of *Drosophila busckii*, *Drosophila hydei*, *Drosophila obscura*, *Drosophila subobscura*, *Drosophila simulans*, *Drosophila suzukii*, *Hirtodrosophila cameraria, , Phortica variegata* and *Zaprionus indianus* in strawberry orchards in Konya, Türkiye. Additionally, *Drosophila obscura, Drosophila simulans, Hirtodrosophila cameraria* and *Phortica variegata* were determined for the first time in Türkiye's strawberry fields. Most of these species are invasive and threaten fruit species.

These results emphasize the importance of regional biodiversity by contributing to the Drosophilidae fauna of Türkiye. In addition, detailed descriptions and photographs of the morphological characteristics of the ten species determined in this study are included in order to facilitate identification. Due to their potential for rapid reproduction and spread, further studies are

required to determine the population dynamics and distributions of these species, as well as their host plants and feeding habits.

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CHECKLIST OF DROSOPHILIDAE (DIPTERA) OF TURKIYE
ORDER: DIPTERA
SUBORDER: BRACHYCERA
SUPER FAMILY: EPHYDROIDEA
Sub Family: Steganinae Herdel, 1917
Genus *Acletoxenus* Von Frauenfeld
Acletoxenus formosus (Loew 1864)
Genus *Amiota* Loew
Amiota allemandi Bachli, Vilela & Haring, 2002
Amiota goetzi Maca,1987
Amiota subtusradiata Duda, 1934
III. Genus: *Phortica* Schiner 1862
Phortica semivirgo Maca,1977
Phortica variegata Fallén,1823
Genus: *Chymomyza* Czerny
Chymomyza amoena Loew,1862
Chymomyza procnemoides (Wheeler, 1952)
Genus: *Gitona*
Gitona distigma Meigen,1830
Genus: *Leucophenga* Mik, 1886
Leucophenga acutipennis Malloch, 1926
Leucophenga maculata Dufour, 1839
Leucophenga helvetica Bachli, Vilela & Haring, 2002
Leucophenga obscuripennis Loew
Subfamily Drosophilinae Rondani, 1856
Genus: *Drosophila* Fallén, 1823
Sub genus: *Drosophila (Dorsilopha*) Sturtevant 1942
Drosophila (Dorsilopha) busckii Coquillett, 1901
Sub genus: *Drosophila (Drosophila*) Fallen
Drosophila buzzatii Patterson & Wheeler,1942
Drosophila flavicauda Toda,1991
Drosophila funebris Fabricius, 1787
Drosophila histrio Meigen, 1830
Drosophila hydei Sturtevant, 1921
Drosophila immigrans Sturtevant, 1921
Drosophila kuntzei Duda, 1924
Drosophila littoralis Meigen, 1830
Drosophila nigrosparsa Strobl, 1898
Drosophila phalerata Meigen, 1830
Drosophila picta Zetterstedt, 1847
Drosophila repleta Wollaston, 1858
Drosophila schachti Baechli, Vilela & Haring 2002
Drosophila testacea Roser, 1840
Drosophila transversa Fallen, 1823
Drosophila virilis Sturtevant,1916
Sub genus: *Drosophila (Sophophora*) Sturtevant, 1939
Drosophila (Sophophora) ambigua Pomini,1940
32. *Drosophila glabra* Chen & Gao, 2015
33.*Drosophila (Sophophora) melanogaster* Meigen, 1830
34. *Drosophila (Sophophora) obscura* Fallén, 1823
35. *Drosophila (Sophophora) simulans* Sturtevant, 1919
36. *Drosophila (Sophophora) subobscura* Collin, 1936
37. *Drosophila (Sophophora) suzukii* (Matsumura, 1931)
38. *Drosophila tristis* Fallen 1823
Sub genus: *Drosophila (Lordiphosa*) Basden
39.*Drosophila (Lordiphosa) andalusiaca* Strobl
40. *Drosophila (Lordiphosa) fenestrarum* Fallén, 1823
Genus: *Hirtodrosophila* Duda, 1923
41. *Hirtodrosophila cameraria* (Haliday, 1833)
42. *Drosophila (Hirtodrosophila) confusa* Staeger,1844
Genus: Scaptodrosophila Duda
43. *Drosophila (Scaptodrosophila) deflexa* Duda,1924
44. *Drosophila (Scaptodrosophila) rufifrons* Loew,1873
Genus: Scaptomyza Hardy, 1850
45. *Scaptomyza adusta* Loew,1862
46. *Scaptomyza flava* Fallén,1823
47. *Scaptomyza graminum* Fallen, 1823
48. *Scaptomyza griseola* (Zetterstedt 1847)
49. *Scaptomyza pallida* (Zetterstedt,1847)
Genus: *Zaprionus* Coquillett, 1901
50. *Zaprionus indianus* Gupta, 1970
51. *Zaprionus tuberculatus* Malloch
52. *Zaprionus ghesquierei* Collart, 1937