



**Original article (Orijinal araştırma)**

**A new species and a new record of *Tephritis* Latreille, 1804 (Diptera: Tephritidae) from Turkey**

Türkiye'den *Tephritis* Latreille, 1804 (Diptera: Tephritidae)'in yeni bir türü ve yeni bir kaydı

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**Abstract**

*Tephritis* Latreille, 1804 is one of the largest genera of Tephritini (Diptera: Tephritidae), which includes about 190 described species. Forty species of this genus have been recorded up to date from Turkey. In the summer 2018, a previously undescribed species of *Tephritis* was collected by sweeping from *Scorzonorea tomentosa* L. (Asteraceae: Cichorieae), in Erzurum Province of Turkey, described herein as *Tephritis turkeri* sp. nov. Also, other Tephritid species *Tephritis zernyi* Hendel, 1927 is recorded for the first time from Turkey. Material is kept in the collection of Gaziantep University Entomology Laboratory.

**Keywords:** Erzurum, new record, new species, Tephritidae, *Tephritis*, Turkey

**Öz**

*Tephritis* Latreille, 1804 tanımlanmış 190 türü ile Tephritini (Diptera: Tephritidae)'nin en büyük cinslerinden bir tanesidir. Bugüne kadar, Türkiye'den bu cinsin kırk türü kaydedilmiştir. 2018 yazında, daha önce tanımlanmamış *Tephritis* türü Türkiye'nin Erzurum ilinden *Scorzonorea tomentosa* L. (Asteraceae: Cichorieae) bitkisinden süpürülerek toplanmış ve bu makalede *Tephritis turkeri* sp. nov. olarak tanımlanmıştır. Ayrıca, diğer Tephritid türü *Tephritis zernyi* Hendel, 1927 Türkiye'den ilk kez kaydedilmiştir. Örnekler Gaziantep Üniversitesi Entomoloji Laboratuvarı koleksiyonunda muhafaza altına alınmıştır.

**Anahtar sözcükler:** Erzurum, yeni kayıt, yeni tür, Tephritidae, *Tephritis*, Türkiye

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## Introduction

Fruit flies are high profile insects among commercial fruit and vegetable growers, marketers, exporters, government regulatory agencies, and the scientific community. Locally, producers face huge losses without some management scheme to control fruit fly populations. At the national and international levels, plant protection agencies strictly regulate the movement of potentially infested products (McPheron & Steck, 1996). Some species of the Tephritidae infest the flower heads of the Asteraceae host plants, collectively belonging to several tribes, with or without the induction of galls (Freidberg, 1984).

*Tephritis* Latreille, 1804 is one of the largest genera of the tribe Tephritini (Diptera: Tephritidae) which includes about 168 described species (Norrbonm et al., 1999). More than 20 species of *Tephritis* have been described from the Middle Eastern and Central Asian areas of Palearctic Region in the last 20 years (Korneyev & Korneyev, 2019). Larvae of *Tephritis* flies feed on Asteraceae (Merz, 1999). For most comprehensive list of host plants see Korneyev, 2016. Most species live in flower heads, but a few species have been reared from stem or even stem-base galls (Merz, 1999).

Species of *Tephritis* have wide range distribution in Turkey and 40 species have been recorded or described from Turkey (Koçak & Kemal, 2013; Korneyev, 2016; Korneyev & Korneyev, 2019).

Main purpose of this study was to contribute to Turkish fruit fly fauna with new species and new record. In the paper, *Tephritis turkeri* sp. nov. is described and illustrated, and *Tephritis zernyi* Hendel, 1927 is recorded for the first time from Turkey.

## Materials and methods

### Collection of specimens

Adult specimens were collected in the summer of 2018 in Erzurum Province of Turkey (Figure 1). Specimens of *T. turkeri* sp. nov. were swept with insect net over possible host plant *Scorzonera tomentosa* L. (Asteraceae) which is an endemic plant for Turkey. *Tephritis zernyi* was swept from *Arctium minus* Bernh. (Asteraceae). Collected samples are pinned and deposited in the collection of the Entomology Laboratory, Department of Biology, Faculty of Arts and Sciences, Gaziantep University, Gaziantep, Turkey (GUGT).



Figure 1. Map of the sampling site (\*) in Turkey.

### Preparation of specimens

Both male and female genitalia were prepared using following procedure: the abdomen was excised from specimen, boiled in NaOH solution (10%) for 45 min, washed with distilled water and genitalia was removed from abdomen. For deporting water, genitalia were held in 96% alcohol during the following 15 min. For deporting alcohol, genitalia were held in xylene 3-5 min. Then, genitalia were placed between microscope slide glass cover slip and were pasted with Entellan.

Terminology and abbreviations generally follow White et al. (1999); additional abbreviations used are: AL, aculeus length; BL, body length; WL, wing length.

### Results

#### *Tephritis* Latreille, 1804

Type species: *Musca arnicae* Linnaeus, 1758

See Hendel (1927), Merz (1994), and Korneyev & Korneyev (2019) for diagnosis and description.

#### *Tephritis turkeri* sp. nov.

Type material. Holotype ♀: Turkey, Erzurum, Aşkale, Kop Mountain, 39°54' N, 41°14' E, 2400 m, 28.06.2018. leg. M. Kütük and M. Yaran. Paratypes 4♀♀, 36♂♂: same locality and date as the holotype leg. M. Kütük and M. Yaran. Materials deposited at Gaziantep University, Gaziantep, Turkey (GUGT).

#### Diagnosis

*Tephritis turkeri* sp. nov. can be distinguished by the following combination of characters: wing with moderately developed pattern not extending into anal cell and anal lobe, brown spots at the end of vein  $R_{4+5}$  and M joined to each other and widened as typical apical fork but separated from main dark area (as in *Tephritis bimaculata* Freidberg, 1981); cell  $r_{4+5}$  at the level of dm-cu with one large hyaline spot and with four round small hyaline spots; cell m with three large hyaline area separated two narrow dark rays; dark rays of cell m reach hind margin of wing; abdomen with white setae; aculeus incised on tip.

The new species is very similar to *Tephritis crepidis* Hendel, 1927 in having wing with wide, subrectangular spots at apices of  $R_{4+5}$  and M either separated or narrowly fused to each other or remaining dark pattern, pterostigma with yellowish or hyaline spot, anal cell and anal lobe mostly or entirely hyaline, crossvein r-m with four small dots surrounding it, oviscape entirely dark setulose without white setulae even in basiventral part, aculeus incised at apex, but very shallowly, spermathecae moderately long, and male phallus without spinulae on the preglans. It differs from *T. crepidis* by having cell  $r_{2+3}$  with two hyaline spots, without the third subapical spot (in *T. crepidis*, third spot usually present), four small dots surrounding crossvein r-m separated (in *T. crepidis*, as a rule, fused forming a pair of hyaline bars), anal cell without dark spots (in *T. crepidis*, usually with two conspicuous gray spots at vein  $A_2$  and cell apical half) and somewhat smaller size (mean wing 3.7 in *T. turkeri* vs. 4.5 in *T. crepidis*).

The new species is also similar to *T. bimaculata*, *Tephritis jabeliae* Freidberg, 1981, *Tephritis spreta* (Loew, 1862), and some specimens of *Tephritis dioscurea* (Loew, 1856) in having two hyaline spots in  $R_{2+3}$  combined with the spots on the apices of veins  $R_{4+5}$  and M separated from the remaining wing pattern, clearly differing from them by having the subbasal hyaline spot in the cell  $r_{4+5}$  8-shaped or split into two smaller spots (subrectangular in *T. bimaculata*, *T. jabeliae*, *T. spreta* and *T. dioscurea*) and oviscape much shorter, usually as long as or slightly longer than tergites 5 and 6 combined.

## Description

Head. Yellow to brown, except ocellar triangle black, occiput black and wide v-shaped; frons as wide as long; eye 1.25 times as high as long; ocellar, frontal and orbital setae dark brown, other setae and setulae yellowish white; first flagellomere of antenna 1.25 times as long as wide; antenna yellow to brown; arista dark brown to black; gena yellow with black setulae; palpus yellow with black setulae (Figure 2c-d).

Thorax. Ground color black, densely gray microtrichose; setulae white and acuminate; all setae brown and acuminate, except posterior notopleural setae whitish; basal scutellar setae two times as long as apical scutellar setae; halter yellow (Figure 2e).

Wing. Pattern brown, apical fork developed and separated from main dark area; three of examined specimens have apical spots isolated from each other (as shown Figure 3a). Basal cells bc, bm and bcu hyaline, cell c hyaline with narrow brown spot at middle; pterostigma brown with yellowish hyaline spot; cell  $r_1$  brown from posterior to pterostigma with two trapeziform hyaline spots; hyaline spots of cell  $r_1$  separated by narrow dark ray; apex of  $r_1$  brown, without hyaline spot; cell  $r_{2+3}$  hyaline at base, with dark area posterior to pterostigma; in cell  $r_{2+3}$  three hyaline spots posterior to spots of  $r_1$  separated by narrow dark rays or partly merged one small hyaline spot under the distal spot; apical half of cell br dark, usually with two small hyaline spots and tiny dot; crossvein r-m dark and two side of vein with two small hyaline spots at the level of vein  $R_{2+3}$ ; vein  $R_{4+5}$  bare; cell  $r_{4+5}$  at the level of dm-cu with one large hyaline spot and with four round small hyaline spots; brown spots at the end of vein  $R_{4+5}$  and M joined each other and widened as typical apical fork but separated from main dark area; basal half of cell dm hyaline, rest part of cell is brown, with one large hyaline spot and two smaller hyaline spots in near the crossvein dm-cu; cell m with three large hyaline area separated two narrow dark rays; dark rays of cell m reach hind margin of wing; cell cu with pale dark irregular pattern; rest of cell almost hyaline; vein A darkened at base, anal cell otherwise hyaline; anal lobe hyaline.

Legs. Brown; femora with dark bands and brown and whitish mixed setulae.

Abdomen. Ground color black; densely gray microtrichose and white setulose; male tergite 5 with and female tergites 5 and 6 black marginal setae. Male terminalia: Epandrium oval and wide as in other *Tephritis* (Figure 3b). Phallus glans moderately short and membranous (Figure 3c); preglans bare. Female terminalia: Oviscape shining dark brown to black, widely white setulose on basal part and, brown setulose and setose posteriorly, as long as tergites 4-6 combined (Figure 2f); aculeus 5.5 times as long as wide, moderately narrowed towards apex (Figure 3d); apex of aculeus abruptly narrowed at apex, almost truncated, with two apical lobes, separated by a very shallow (half as deep as lobe width) incision on tip (Figure 3f); spermathecae 6-7 times as long as wide, papillose (Figure 3e). Measurements: Male: BL = 4.7-4.9 mm; WL = 3.5-3.7 mm (n = 10). Female: BL = 5.2-5.4 mm; WL = 3.7-4.0 mm (n = 5); AL = 1.6 mm.

Host plant. Unknown. Adults of *T. turkeri* sp. nov. were swept from *S. tomentosa*, an endemic plant in Turkey, which is its possible host plant.

## Etymology

This species is named after Mustafa Türker Kütük, the son of first author.

## Zoobank number

This work and the nomenclatural acts it contains have been registered in the ZooBank. The ZooBank Life Science Identifier (LSID) for this publication is urn:lsid:zoobank.org:pub:79B3937C-8581-4E0A-9AE2-019DE7E38A84.

***Tephritis zernyi* Hendel, 1927**

Specimens examined. 3♀♀, Turkey, Erzurum, Kop Mountain, 40°01' N, 40°31' E, 2378 m, 28.06.2018. leg. M. Kütük and M. Yaran.

Host plant. *A. minus*.

Comment. Detailed description and diagnosis of *T. zernyi* were provided by Korneyev & Korneyev, 2019. In this study, *T. zernyi* was recorded for the first time from Turkey (Figure 4a-c).



Figure 2. Adult figures of *Tephritis turkeri* sp. nov. a) holotype ♀; b) paratype ♂; c) head (lateral); d) head; e) thorax; f) female abdomen (Scale bar=1 mm).

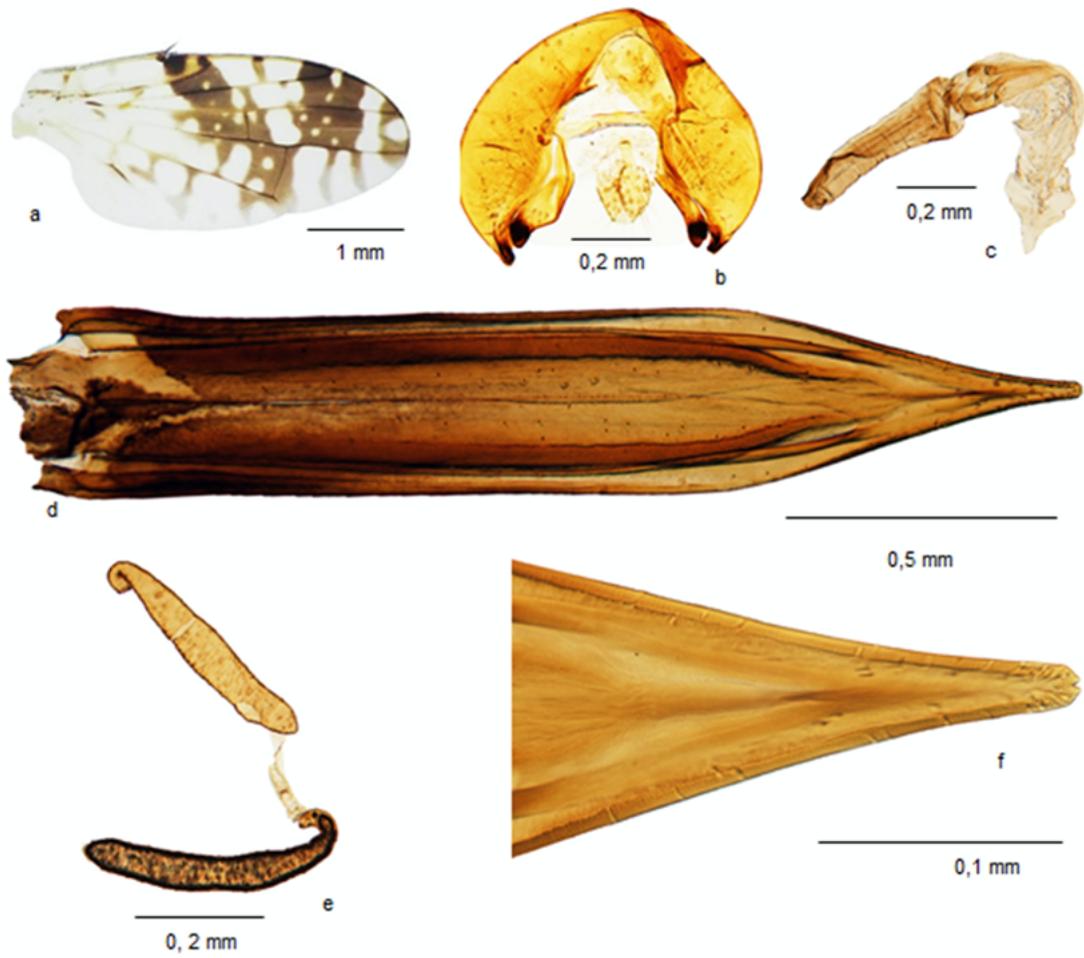


Figure 3. Wing and genitalia of *Tephritis turkeri* sp. nov. a) wing; ♂ b) epandrium; c) glans; d) aculeus; e) spermatheca; f) apex of aculeus.

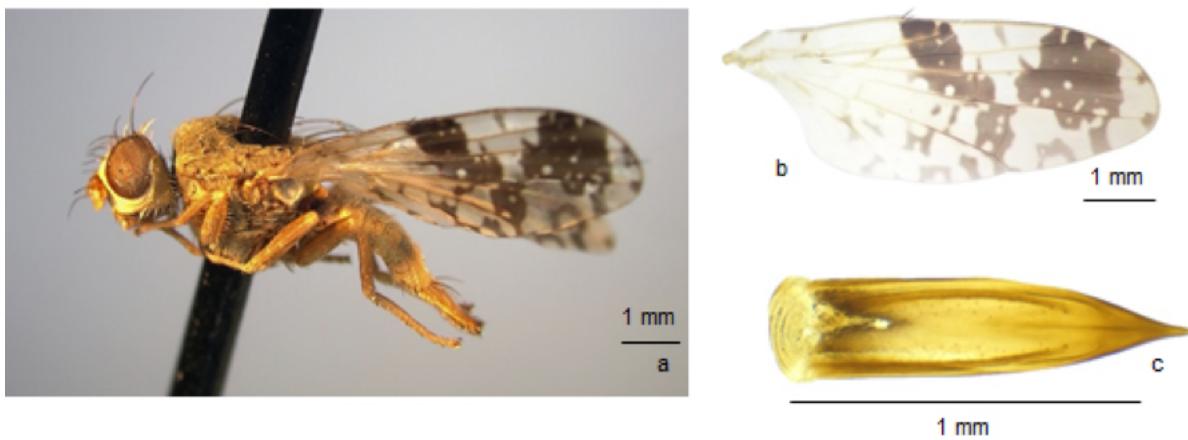


Figure 4. *Tephritis zernyi* a) adult; b) wing; c) aculeus (scale bar=1 mm).

## Discussion

*Tephritis turkeri* new species is very similar to *T. bimaculata*, *T. jabeliae* and some populations of *Tephritis conyzifoliae* Merz, 1992 and with apical fork separated from main dark area. It can be easily distinguished from *T. bimaculata* with dark wing pattern, small hyaline spots in cell  $r_{4+5}$  and cell dm and three large hyaline area in cell m (in *T. bimaculata* posterior hyaline area of cell m separated with dark ray) and can be easily distinguished from *T. jabeliae* with larger hyaline spot on apex of wing, unique hyaline spots in cell  $r_1$ ,  $r_{2+3}$  and cell  $r_{4+5}$  and apex of aculeus (in *T. turkeri* sp. nov. aculeus incised on tip). Also, it is similar to *T. conyzifoliae* and *T. crepidis* with incised aculeus on tip and separated apical fork (some populations see Korneyev & Korneyev, 2019). In addition to that, it can be easily distinguished from *T. conyzifoliae* and *T. crepidis* with different size and type hyaline areas of wing cells and completely hyaline anal cell and anal lobe.

Freidberg & Kütük (2002) revised *Tephritis pulchra* (Loew, 1844) group and only the species of *T. pulchra* group were associated with genus *Scorzonera*. *Tephritis turkeri* sp. nov. were swept from *S. tomentosa* which is an endemic plant from Turkey. Although any biological has not been conducted for this paper, we suppose that this plant can be a host for *T. turkeri* sp. nov.

The new species, however, shows strong similarity with *T. crepidis*, which develops in flower heads of *Crepis* spp., the genus of the tribe Cichorieae of the family Asteraceae, to which *Scorzonera* also belongs.

*Tephritis zernyi* was recorded in this study for the first time from Turkey. One hundred and seventy species of fruit flies had previously been described or recorded from Turkey (Korneyev, 2016; Görmez & Kütük, 2020). Together with those reported here, the number of the fruit flies determined in Turkey is 172.

It is clear that Turkey has many different biotopes and ecological conditions. Many species, genera and families will be waiting to be discovered in Turkey, and some species might become extinct before they can be collected and described (Yaran, 2019).

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