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FIRST RECORD OF A SPORE-FEEDING THRIPS SPECIES, *COMPSOTHRIPS RETICULATES* GUO & FENG, 2006 (THYSANOPTERA: PHALEOTHRIPIDAE: IDOLOTHRIPINAE) FROM TÜRKİYE

| **Ekrem Atakan*** | **Kevser Sabancı**** | **Mahmut Murat Aslan**** |

* Plant Protection Department, Agricultural Faculty, University of Çukurova Adana, TÜRKİYE. E-mail: eatakan@cu.edu.tr, ORCID ID: 0000-0001-7352-4815
** Kahramanmaraş Sütçü İmam University, Agricultural Faculty, Plant Protection Department, Avsar Campüs, Kahramanmaras, TÜRKİYE. E-mails: kvsrsbnc@gmail.com, aslan@ksu.edu.tr, ORCID IDs: 0000-0001-8012-0229 and 0000-0002-4586-1301

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ABSTRACT: *Compsothrips reticulates* Guo & Feng, 2006 (Thysanoptera: Phlaeothripidae: Idolothripinae)**,** which is a spore-feeding thrips, was recorded for the first time on the decayed almond fruits, where it had remained on the tree from the previous year in 2023 in the location Besni, Adıyaman Province, Türkiye. With this record, two species of this genus have been included in the Turkish Thysanoptera fauna. Both male and female adult individuals of this species were found. The distinctive features that differentiate this species from the previously recorded *Compsothrips albisignatus* (Reuter, 1884) are that it has only one sense cone on the third antenna segment, and the antenna of adult individuals are reticulated. The taxonomic features of both female and male individuals are given in detail.

KEY WORDS: Almond, *Compsothrips reticulates*, reticulation, spore-feeding thrips, Türkiye

There are approximately 6000 species of thrips worldwide. Thysanoptera, to which thrips belong, is divided into two suborders: Terebrantia and Tubulifera. While there are 2000 species in the Terebrantia suborder, there are 3500 species in Tubulifera (Bhatti, 1979; Mound et al., 1980). Up to 2016, 193 thrips species have been recorded in Türkiye (Tunç & Hastenpflug-Wesmanis, 2016). Among Thysanoptera species, some of them feed on prey, phytophagous species, and species that feed on fungal spores. All species belonging to the Aeolothripidae family are known as predator thrips species belonging to the *Scolothrips* genus (Thripidae). *Haplothrips kurjumovi* and *Haplothrips subtilissimus*, belonging to the Phlaeothripidae family, are also predators. The majority of thrips species are harmful species that feed on various parts of plants (for example, species representing the genera *Anophothrips*, *Dendrothrips*, *Frankliniella, Haplothrips*, *Megalurothrips*, *Microcephalothrips*, and *Scirtothrips*).

Idolothripinae is one of the smaller subfamilies of Phlaeothripidae, comprising approximately 700 species. In contrast, the subfamily Phlaeothripinae has 2800 species. In Türkiye, 16 genera of Phlaeothripidae have been identified. The genera *Bolothrips*, *Compsopthrips*, *Cryptothrips*, *Megathrips*, *Nesothrips,* and *Pseudochryptothrips* have been recorded from the subfamily Idolothripinae. Species of Idolothripinae have a large, developed body form, with body sizes ranging from 1 mm to 15 mm (Eow et al., 2011). Thrips in this group have

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interesting biological characteristics; polymorphism among males of many species is quite striking (Crespi, 1989; Mound, 2005). Some species exhibit varying sex allocation and reproductive modes, with some being viviparous and others ovoviviparous (Kranz et al., 2002). Additionally, males are observed to fight each other to protect egg colonies. Adults and larvae of Idolothripinae, a subfamily within Thysanoptera, are assumed to form large colonies and feed on fungal spores. As evidence, some species have been found to have intact fungal spores on the walls of their intestines. However, no evidence exists for all species thought to feed on fungi. These thrips create large colonies of hundreds of individuals on leaf litter, dead branches, and dead leaves hanging from trees (Mound & Palmer, 1983; Morse & Hoddle, 2006; Tree et al., 2010). Species of *Compsothrips* and *Bolothrips* are closely associated with fungi in marshy and herbaceous plants. Additionally, species of *Compsothrips* are markedly ant-mimicking in appearance and behavior. Species of Idolothripinae emerge in the early stages of fungal decay. Species belonging to the subfamily Idolothripinae are primarily common in tropical regions, especially in moist tropical areas. A few species are found in temperate or arid regions. In Türkiye, only one species of the genus *Compsothrips* has been reported, namely *Compsothrips albosignatus* (Reuter, 1884) (Tunç et al., 2012). Additionally, *Thylothrips osborni* (Hinds, 1902), which feeds on fungus spores, has been reported for the first time from Isparta province in Türkiye. The same species was found in Iran in 2022, collected from Quercus leaf litter (Mirab-balou et al., 2022). Very little is known about species feeding on fungus spores in the Palaearctic region. However, *Phlaeothrips annulipes* (Thysanoptera: Phlaeothripidae) has been reported from Iran (Mirab-balou & Minaei 2022). Despite the recording of 20 thrips species feeding on fungus spores in Iran, only *Compsothrips albosignatus* (Reuter) has been found regarding species of the genus *Compsothrips* (Mound & Palmer, 1983; Hakimara et al., 2019; Mirab-balou, 2019; Minaei & Mound, 2020; Alavi & Minaei 2021).

In this study, in addition to *C. albisignatus*, the morphological characteristics of *Compsothrips reticulates* Guo & Feng, 2006, first recorded in Türkiye, are presented, along with brief information on its importance within the fauna of Türkiyr. Besides, in the previous study (Gao & Feng, 2006), only the morphological detailed descriptions of male individuals of *C. reticulates* were provided, while in this study, slide-mounted specimens of both male and female individuals and some natural views were presented.

MATERIALS AND METHODS

Collection of samples

This thrips species was collected from almond trees located near the roadside in the village of Oyalı, Besni district of Adıyaman Province, Türkiye (Lat/Lon: 37.719627/37.820548) by gathering dried almond fruits remaining on the trees from the previous year (Fig. 1). During pest and beneficial insect surveys on almond trees between August 9 and 16 (sampling was conducted three times), at least 50 dried and remaining fruits on the branches were randomly collected and placed in polyethylene bags. The samples were examined in the laboratory, and all wingless adult individuals were preserved in 60% ethyl alcohol for further processing (Fig. 2a). Larvae of this species were not found in the sampled fruits.

Larvae could not be obtained from the cultured eggs (Fig. 2b). A total of 150 fruit samples from the three sampling events were examined in the laboratory.



Figure 1. The decayed almond fruits, on which *Compsothrips reticulates* were collected.

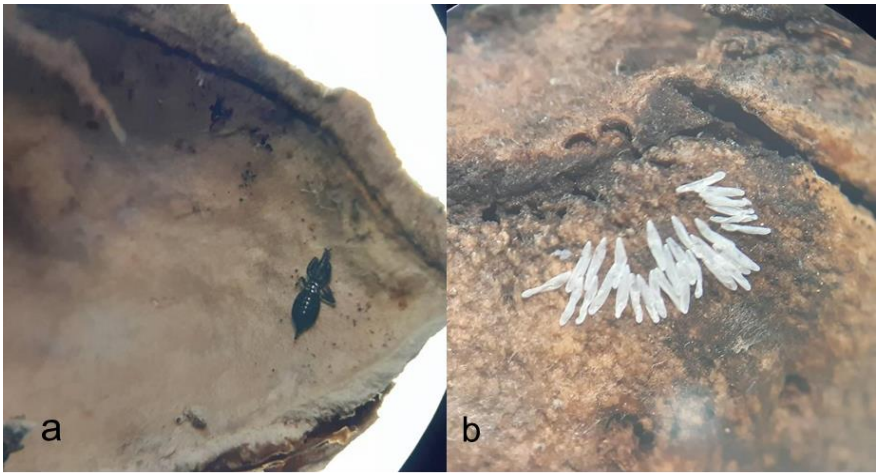

Figure 2. The natural views of adult (a) and egg mass (b) of *Compsothrips reticulates*.

Thrips preparation and identification

Preparations were made for 10% of adult males and females. No variation was observed in measurements across all specimens. Collected adult individuals (a total of 135 specimens) were first soaked in AGA solution (9 parts ethyl alcohol, 1-part glycerin, and 1-part glacial acetic acid) for two days to facilitate the removal of body tissues and partially internal contents. Due to their dark color, the samples were kept in a 5% sodium hydroxide solution in glass dishes in a dark environment for approximately 4 days. The specimens were cleaned by entering through the coxa part of the third pair of legs with a fine-tipped needle in a Petri

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dish containing absolute alcohol. Additionally, their bodies were gently stroked ventrally to remove internal contents. The specimens were then transferred to Hoyer's medium and prepared for mounting. It was determined that all examined adult female and male individuals belonged to a single species. The slide-mounted specimens were observed under a fluorescence microscope (Olympus BX51, Tokyo, Japan). The identification was done by the senior author using a published identification key (Mound & Palmer, 1983; Eow et al., 2011; Gao & Feng, 2006; Dang & Qiao, 2013). Measurements of some body parts of prepared male and female individuals were taken and photographed.

RESULTS AND DISCUSSION

Genus *Compsothrips* Hood

There have been 27 species identified worldwide within *Compsothrips* (Mound, 2011). The distinct features that set the genus *Compsothrips* apart from other genera in the subfamily Idolothripinae include the elongation of the metathoracic sternopleural suture extending to the coxa of the hind leg. There are two sense cones on the 4th antennal segment, and the eyes are elongated backward on the ventral surface of the head (Stannard, 1975; Mound & Palmer, 1983; Dang & Qiao, 2013).

Compsothrips reticulates Guo & Feng, 2006

The examined material consisted of all collected male and female individuals, which were dark and wingless (Figs 3a, b). It was determined that male individuals were slightly smaller than females. The highly developed femur in males is noteworthy. This observation may be related to the literature indicating that male individuals engage in fights with each other, especially for the protection of deposited eggs (Fig. 3b).



Figure 3. The slide-mounted views of adult female (a) and adult male (b) of *Compsothrips reticulates*.

Descriptions

Female (Holotype). In this study, 25 female individuals were recorded. Body and legs are dark brown. The antenna is 8-segmented, with the apical of the first and second segments and the apical parts of the third and fourth segments being dark-colored (Fig. 4a). The base of the fifth antenna segment is light yellow, while the remaining part is dark-colored. The transverse lines (striates) seen prominently in the third antenna segment emerge as an important morphological

feature in differentiating other species, making the length of the head slightly more than twice its width. The compound eyes are elongated ventrally (Fig. 4b). Ocelli are absent. Metanotum constricted and raised medially. There are no prominent long hairs on the protorax, excluding epimerals. The metapraesternum is boat-shaped (Fig. 4c). The pelta is trapezoidal. There is no wing retaining setae on the abdominal segments (Fig. 4d).



Figure 4. The slide-mounted body parts of adult female: an (antenna), (b) head and front legs, sternums of the thorax (pro- meso and meta sternums), (d) S1 setae on the 9th abdominal segment, anal setae on the 10th segment.

Measurements. The body length of females is measured at 1120 microns. The head length 976 microns, width behind eyes 335 microns. The length of the compound eyes is 146 microns, and the width is 123 microns, making the length twice the width. Postocular setae 60 microns. Pronotum length, 305, with width 500 microns. In the corners of the pronotum, there are no noticeable setae; the epimerals are 36 microns. The S1 seta on the 9th abdominal segment is blind and approximately 213 microns long (Fig. 4d). The 10th abdominal segment is short

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and tube-shaped, with the length of 341 microns, basal width 213. Antennal segments I-VIII 79, 91, 244, 109, 92, 61, 43, 43 microns.

Male (Holotype): A total of 111 male individuals were recorded. Adult males are slightly smaller than females. Body and legs are dark brown. The antenna is 8-segmented, with the apical of the first and second segments, and the apical parts of the third and fourth segments being dark-colored (Fig. 5a). The length of the 4th antenna segment is approximately 2.5 times its width (Fig. 5a). The antennae are distinctly reticulated (Fig. 5a). The length of the head is approximately three times its width (Fig. 5b). In male individuals, the femur is more developed than in females, and the tooth on the tarsal segment is more prominent compared to females (Fig. 5b). There are no prominently developed hairs on the prothorax (Fig. 5c). The metapraesternum is boat-shaped (Fig. 5c). The pelta is trapezoidal. There is no wing retaining setae on the abdominal segments. The 10th abdominal segment has a short tube.

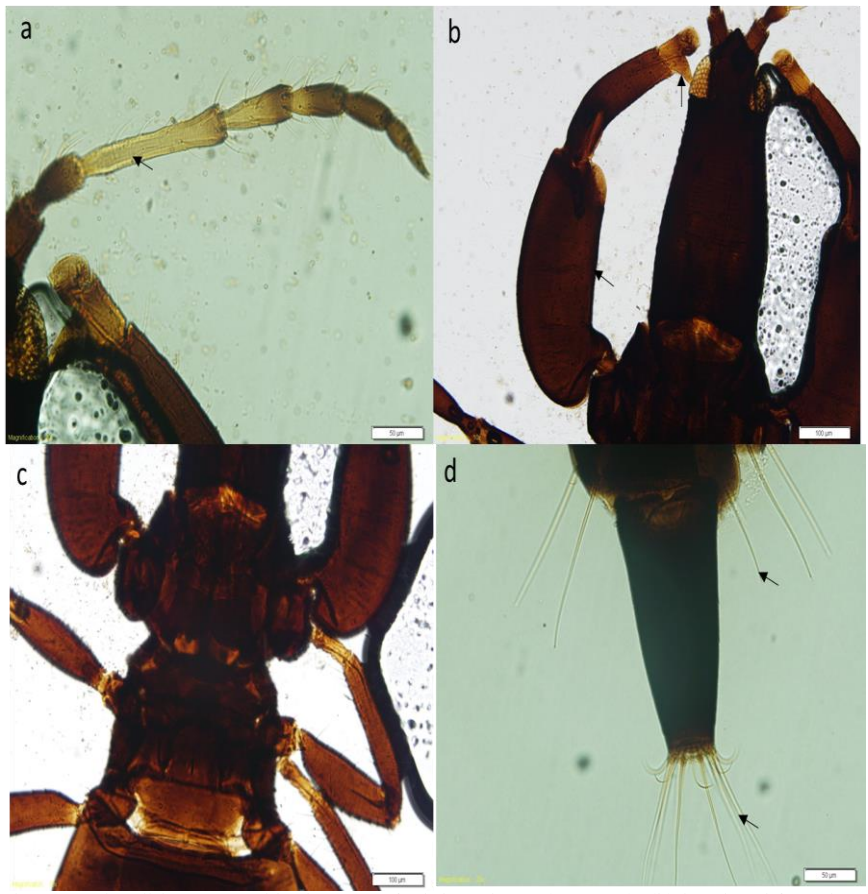

Figure 5. The slide-mounted body parts of adult males: a (antenna), (b) head and front legs, sternums of thorax (pro- meso and meta sternums), (d) S1 setae on the 9th abdominal segment, anal setae on the 10th segment.

Measurements. The body length of males is measured at 1080 microns. The body length of females is measured at 1120 microns. The head length 854 microns, width behind eyes 335 microns. Postocular setae 49 microns. Pronotum length, 427, width 549 microns. In the corners of the pronotum, there are no noticeable setae, including epimeral setae. The S1 seta on the 9th abdominal segment is blind and approximately 244 microns long (Fig. 4d). The 10th abdominal segment is short and tube-shaped, with the length of 335 microns, basal width 152. Antennal segments I-VIII 73, 91, 244, 122, 92, 791, 61, 61 microns.

Materials examined. Female and male apterous. Besni, Adıyaman province Türkiye, decayed almond fruits., 9-16, viii, leg. K. Sabancı.

Host: Unknown.

Distribution: China, Türkiye, with the present study.

Comments: One of the most distinctive morphological characters that differentiate this species from *C. albosignatus* is the presence of only 1 sense cone on the 3rd antennal segment in *C. reticulatis,* whereas *C. albosignatus* has 2 (Mineai & Alichi, 2002; Mirab-balou, 2011). Additionally, there is a pair of conspicuous chalk-white spots on the lateral side of the metanotum in *C. albosignatus*, which is absent in *C. reticulates*. Additionally, the presence of egg masses along with adult individuals may indicate that females reproduce larvae by feeding on fungi in rotten almond fruits.

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