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Short Communication

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First report of the chilli thrips, *Scirtothrips dorsalis* Hood, 1919 (Thysanoptera: Thripidae) in Turkey

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Abstract: The chilli thrips, *Scirtothrips dorsalis* Hood, 1919 (Thysanoptera: Thripidae) was reported for the first time in Adana Province, Turkey in October, 2020 on blueberries [*Vaccinium myrtillus* L. (Ericaceae)]. Its heavy infestation was detected on the vegetative parts of the blueberries. In this short communication, a brief summary of its diagnosis and damage as well as its economic importance in the region is provided.

Key words: *Scirtothrips dorsalis*, first report, Turkey

Climate change, globalization, and open agricultural trade have resulted in the increasing importance of invasive species as recurrent problems throughout the world. Most of the thrips species are considered among the most invasive species in the world due to their small size, ability to reach high numbers shortly, cryptic behavior, and egg laying inside plant tissue (e.g., all Terebrantia) (Morse and Hoddle, 2006). Approximately 6000 thrips species, in which 1% of the total members of Thysanoptera order were reported as serious pests, have been well described with their diverse life histories and habitats (Morse and Hoddle, 2006; Mound and Morris, 2007). The genus *Scirtothrips* Shull contains more than 100 species, among which ten species are often regarded as important pests of agricultural crops (Rugman-Jones et al., 2006). Their unique reproductive potential and capability for invasion integrated with easy adaptation to newly invaded areas make *Scirtothrips* species a major concern for agriculture in many countries (Hoddle et al., 2008). Among this genus, *Scirtothrips dorsalis* Hood 1919 (Thysanoptera: Thripidae), which are commonly known as the chilli thrips or yellow tea thrips, are a highly polyphagous pest of economically important vegetable, ornamental, and fruit crops in Asia, Oceania, Africa, and America (Ananthakrishnan, 1993; Kumar et al., 2012; CABI, 2013; Dickey et al., 2015).

Many researchers have reported that *S. dorsalis* originated in either Southeast Asia or in the Indian subcontinent, but since the late 1990s it has been widely distributed to Europe (England, Netherlands, Spain), Middle East (Iran, Israel, Saudi Arabia), Asia (Indonesia, Japan), Central Africa (Côte d'Ivoire, Uganda, Kenya), and the New World (USA, Barbados, Guadeloupe, Jamaica, Saint Lucia, Saint Vincent and the Grenadines, Trinidad, and Venezuela) (CABI, 2013; Minaei et al., 2015; EPPO, 2020). In the last two decades, this pest has spread around by transporting plant materials infested by this pest thrips, such as propagules, cut flowers, fruits, vegetables, and through its natural dispersion by the wind (Seal et al., 2010; Kumar et al., 2013).

Following the introduction into the New World, the host range of *S. dorsalis* increased up to more than 225 plant taxa in 72 different families (GPDD, 2011). Although the main host plants of this pest belong to the family Fabaceae, it can attack mainly economically important agricultural crops including chilli, tea, banana, bean, citrus, cocoa, corn, cotton, eggplant, grapes, mango, melon, peanut, rose, strawberry, sweet potato, tobacco, and tomato throughout the world (Garrett, 2004; Venette and Davis, 2004; Patel et al., 2009; Reitz et al., 2011). Some of the reasons as to why it is a successful invader could be due to its wide distribution and having a large number of host plants globally. In India, *S. dorsalis* was considered one of the most crucial factors that restricted the chilli production, and the damage of this pest alone can reach up to 74% (Patel et al., 2009). Moreover, this pest is considered a major concern to tea, grape, and citrus production in Japan (Kodomari 1978; Masui, 2007; Shibao et al., 2004). In addition, Garrett (2004) reported that due to its invasion into the Caribbean region (U.S.A), *S. dorsalis* caused crop losses on 28 important host plants, costing approximately $3 billion to the US economy.

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Following the complaint of a thrips problem in the blueberries grown in a greenhouse in Adana Province of Turkey, leaf samples were taken from the infested plants and pest samples were collected by shaking a minimum of 25 plants into a white container. The collected thrips specimens were taken into Eppendorf (2 cc) tubes. The collected leaves were placed in air-free plastic bags brought to the Laboratory of Entomology at Çukurova University. Thrips specimens were kept in the AGA (9 part 60% ethyl alcohol, 1 part glacial acetic acid, and 1 part glycerin) solution. The samples were then placed into 5% NaOH media until a slight color change was achieved. The samples were taken to the HOYER media and mounted. The preparations (microscope slides) were allowed to dry by keeping them in an oven at 45 °C for about 3 weeks. Species identification of thrips was made by the senior author, using the keys provided by Zur Strassen (2003).

The majority of thrips individuals collected were adult females. Very few larvae of this species were detected. According to result of identification, all thrips individuals belonged to *Scirtothrips dorsalis* Hood, 1919 (Thysanoptera: Thripidae). Voucher specimens were deposited at the Laboratory of Entomology at Çukurova University, Adana, Turkey. Identified adults were observed as less than 1.5 mm in length with dark wings (Figure 1).

The body of adult *S. dorsalis* is pale yellow in color and bear dark brown antecostal ridges on tergites and sternites (Figure 2a). Abdominal tergites with a median dark patch (Figure 1a); ocellar setae pair III situated between posterior ocelli (Figure 2b); 2 pairs of median postocular setae present; pronotum with four pairs of posteromarginal setae (Figure 2b), major setae 25–30 μm long; metanotum medially with elongate recticles or striations, arcuate in interior third, median setae not at anterior margin (Figure 2c); forewing first vein with three setae distally, second vein with two setae (Figure 2d), posteromarginal cilia straight; tergal microtrichial fields with 3 discal setae, VIII and IX with microtrichia medially; sternites with numerous microtrichia, more than two complete rows medially.

With the current study, *S. dorsalis* was detected for the first time on blueberries [*Vaccinium myrtillus* L. (Ericaceae)] in October 2020 in Adana Province, Turkey. Blueberries are grown mostly in the Black Sea Region of Turkey. Turkey's production is approximately 30 t, and the production in the next decade is expected to increase to 2000 t (Çelik, 2012). Ortzi et al. (2020) reported that *S. dorsalis* was the main pest on the blueberry leaves in Mexico and also this thrips species uses blueberries to feed and reproduction. Moreover, this pest species was added to Turkish Thysanoptera fauna previously reported by Tunç et al. (2012a, 2012b) and Tunç and Hastenpflug-Vesmanis (2016).

Scirtothrips dorsalis generally causes damage by extracting the contents of epidermal cells, leading to the

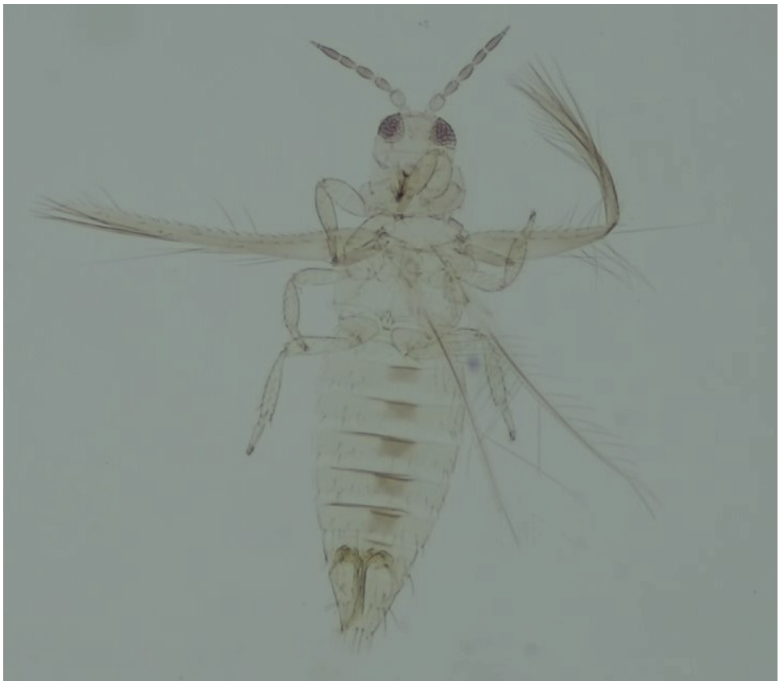

Figure 1. General view of slide-mounted female of *Scirtothrips dorsalis* (ventral view).

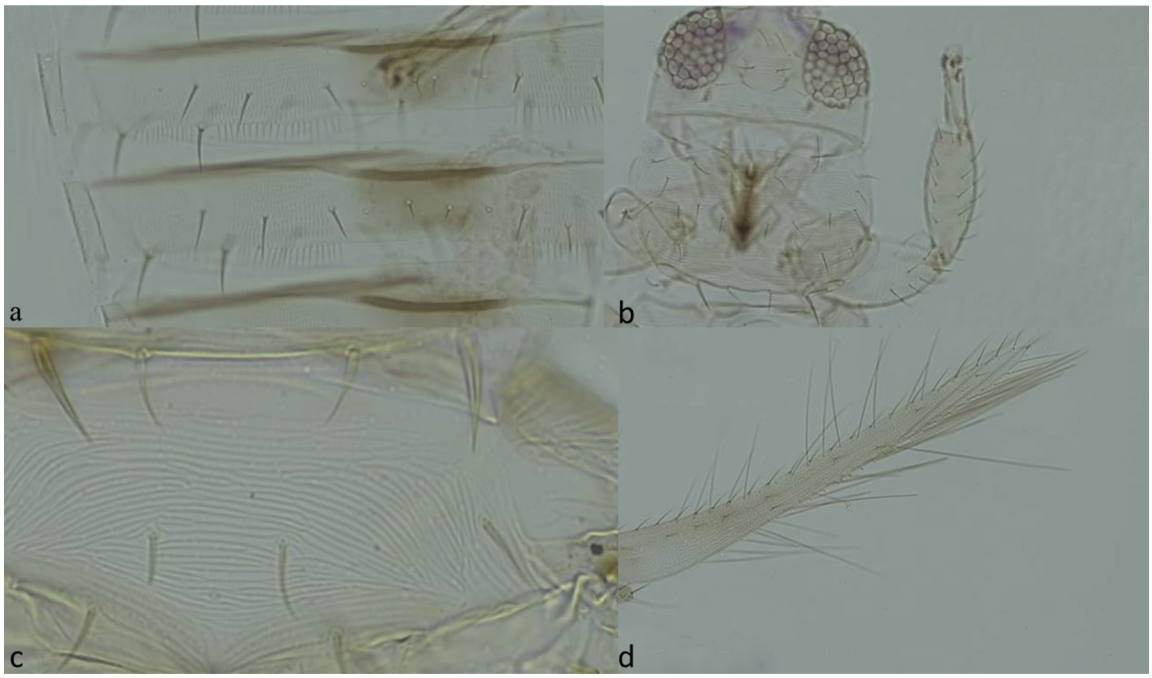

Figure 2. Views of different body parts of the slide-mounted female of *Scirtothrips dorsalis*; a: dark brown antecostal ridges on tergites, b: ocellar setae pair III and four posteriomarginal setae, c: metanotum with median seta, d: forewing first vein with three setae distally, second vein with two setae.

necrosis of tissue on young leaves and the terminal shoots of the blueberries (Figure 3). The damaged tissue is changed from silvery to brown or black. The presence of *S. dorsalis* is recognized by the appearance of discolored plant parts. The feeding damage is often described by bronzed scars on the leaves and stems (Figure 3).

Around the apex, a conspicuous ring is generally formed on the scarred tissue, and also fruit distortion and premature leaf senescence occur (Kumar et al. 2013). In addition to its direct damage to plants, thrips can also cause damage by transmitting to the Tospovirus, which are detrimental to some agricultural crops (Mound and Palmer, 1981; Ananthakrishnan, 1993). When the infestation levels are high, it can feed on the upper surfaces of the leaves of the host plants. The small size (<2 mm) eggs are inserted into soft plant tissues, and the eggs may hatch within 1 week. These characteristics of the thrips increase its distribution due to the transportation of *S. dorsalis* through open agricultural trades of fresh plant materials. Mobile stages are often accumulated to the central vein of young leaves or near the damaged area of leaf tissues (Kumar et al., 2013). Pupae can be found in the leaf litter on the soil, in the axils of the leaves, in curled leaves, or under the calyx of the flowers and fruits.

The host plant species have influenced the life span of the chilli thrips. At 26 °C, the immature development time of *S. dorsalis* can range between 17.8 and 20.6 days on the bean, eggplant, pepper, rose, squash, and tomato plants (Seal et al., 2010). It can be active from 9.7 °C to 33.0 °C and can reach up to 18 generations per year in tropical and subtropical regions. Moreover, when the temperature remains below –4 °C for 5 or more days, *S. dorsalis* cannot survive over winter in these regions (Nietschke et al., 2008).

The temperature in Adana, Turkey, does not drop below minus degrees including during cold winter periods. It seems that the *S. dorsalis* may have a great potential to spread quickly around the region with polyculture production ongoing throughout the year. Moreover, Adana Province is considered to be a milestone of Turkish agriculture with 4.8 million tons of agricultural production annually (TUIK, 2018). The introduction of the invasive thrips to the region reinforces? that international trade of the agricultural crops should be under control by inspectors in Turkey. Further studies such as the distribution area, host plants, and potential natural enemies of this thrips in Turkey are needed to control this pest efficiently by Integrated Pest Management (IPM) approaches.

Figure 3. Damage symptoms on leaves and stems of the blueberry plants due to *Scirtothrips dorsalis*.

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