

Some Morphological Characteristics of *Contarinia pruniflorum* Coutin & Rambier (Diptera: Cecidomyiidae)

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Abstract

The Apricot flower midge (*Contarinia pruniflorum*) is a pest of stone fruit trees and lays its eggs in the flower buds before the pink bud stage of the apricot. It is a pest that has a direct impact on the yield of the tree. This study was conducted in 2017-2018 in Malatya province of Türkiye to determine the morphological characteristics of certain biological stages of *Contarinia pruniflorum*. In the morphological examinations, the morphological characteristics of the adult female, adult male, mature larva, and pupa were described and measurements were made on some body parts. The average body width of the adult female is 0.43 mm, with a length without antennae of 1.81 mm. The average antenna length is 0.91 mm and consists of 12 segments. The average body width of the adult male is 0.34 mm and the body length excluding antennae is 1.68 mm. The mature larva has an average width of 0.49 mm and a length of 2.17 mm. The pupa has an average width of 1.09 mm and a length of 2.22 mm. The study contributed to population monitoring by introducing the pest to growers and researchers.

Key words: *Contarinia pruniflorum*, Apricot pest, Morphological characteristics

Contarinia pruniflorum Coutin & Rambier (Diptera: Cecidomyiidae)'un Bazı Morfolojik Özellikleri

Özet

Sert çekirdekli meyve ağaçlarının bir zararlısı olan Kayısı çiçek sineği (*Contarinia pruniflorum*) kayısının pembe tomurcuk döneminden önce çiçek tomurcuklarına yumurtasını bırakır. Meyve ağacının ürün miktarına direkt etki eden bir zararlıdır. Çalışma, *Contarinia pruniflorum*'un bazı biyolojik dönemlerindeki morfolojik özelliklerinin belirlenmesi için 2017-2018 yıllarında Malatya (Türkiye)'de yürütülmüştür. Morfolojik incelemelerde, ergin dişi, ergin erkek, olgun larva ve pupanın morfolojik özellikleri tanımlanarak zararlının bazı vücut bölümlerinde ölçümler yapılmıştır. Ergin dişinin ortalama vücut genişliği 0.43 mm, anten hariç uzunluğu 1.81 mm'dir. Anten 12 segmentten oluşmuş olup uzunluğu 0.91 mm'dir. Ergin erkeğin ortalama vücut genişliği 0.34 mm, anten hariç vücut uzunluğu 1.68 mm'dir. Olgun larvanın ortalama genişliği 0.49 mm olup uzunluğu 2.17 mm'dir. Pupa genişliği 1.09 mm ve uzunluğu 2.22 mm'dir. Çalışma ile yetiştiricilere ve araştırmacılara zararlıyı tanıtarak popülasyon takibi yapılmasına katkı sağlanmıştır.

Anahtar Kelimeler: *Contarinia pruniflorum*, Kayısı zararlısı, Morfolojik özellikler

Introduction

Contarinia pruniflorum Coutin & Rambier (Diptera: Cecidomyiidae) (Apricot flower midge) adults lay their eggs on the flower buds of trees belonging to stone fruit species. The hatching larvae feed through the bud wall and the genital organs of the flower. The damaged flower does not bear fruit (Yiğit and Tunaz, 2021). The pest overwinters in the soil in the pupal stage and produces one generation per year (Pollini and Bariselli, 1996; Yiğit and Tunaz, 2023). Successful results have been achieved in the chemical control against adult stage of the pest (Yiğit and Tunaz, 2021). In addition, *Gastrancistrus pacillus*, *Synopeas* sp., and *Gastrancistrus pruniflorum* have been identified as larval parasitoids of the pest (Rambier and Coitin, 1955; Doğanlar and Yiğit, 2019). The pest was first

detected in *Prunus* species and some biological characteristics were identified (Rambier and Coitin, 1955). Then it was detected on *Prunus* cultivars in Czechoslovakia, Italy, Greece, and Türkiye. Some studies have been conducted such as determination of some biological terms, pest control, and cultivar preferences (Pollini and Bariselli, 1996; Gagne, 2004; 2017; Montuschi et al. 2004; Tsagarakis and Mitsopoulos, 2007; Doğanlar et al. 2014; Yiğit and Tunaz, 2021; 2023). It was first identified morphologically by molecular characterization using the COI gene sequence (Kaplan and İnal, 2021). For the first time in Türkiye, apricot was found to be damaged by the pest in Malatya province (Doğanlar et al. 2014; Kaplan, 2014). In addition, assessments were made on the prevalence areas and damage rates of the pest in Malatya province

and its bioecology was evaluated (Yiğit and Tunaz, 2021; 2023). The pest spends much of its life cycle as a mature larva and pupa in the soil. The adult stage of the pest is very short. The time when the pests lay their eggs is in the late winter months when gardening is minimal. Therefore, it is difficult to recognise and identify the pest. This study aims to contribute to growers and researchers by providing morphological descriptions of some biological stages of the Apricot flower midge.

Material and Method

The material of the study consists of the adults, larvae, and pupae of *C. pruniflorum* as well as laboratory equipment and materials.

Collecting *Contarinia pruniflorum*

In the apricot orchard of Hacıhaliloğlu variety in Yeşilyurt district of Malatya province, a 2 m² area was designated in 2017 where a considerable number of mature larvae were released. Square prism cages measuring 25x40 cm were placed in the area for biological monitoring of the pest. Over a year, observations were made and pupae and adults were collected. They were then taken to the laboratory for measurements.

During the observations after the pest had laid its eggs in apricot buds, the larva in the buds in which the eggs were laid were classified according to their biological stages. They were then taken to the laboratory for measurements.

Measurements

The body length and width, antenna length, wingspan, and length-width measurements of the mature females and males were measured, as well as the length and width of the mature larva and the length, width, and circumference of the pupa. The measurements and photos were taken with a Nikon e200 microscope.

RESULTS

Morphological studies

Measurements have been made on some biological stages of the pest and photos of some body parts are shown below.

Adult female

The adult female has an average body width of 0.43 mm and a length, excluding antennae, of 1.81 mm, with an orange-red body color. The head, thorax, and legs are black. The palp has four segments, the first of which is very short and the following segments are twice as long as the previous one. The antenna of the adult female is about 0.91 mm long and consists of 12 segments. It has a cylindrical shape and the flagellum consists of two fused parts. There are irregular and long sensory hairs on the segments. The legs are blackish and the tarsal claws

are oblique. The empodium is only weakly developed and corresponds to the length of the claw. It has a long ovipositor, which can grow up to 2 mm long when laying eggs. The wings of the adult female are transparent, about 0.74 mm wide and 2 mm long and have only a few veins. Some body parts of the adult female are shown in Figure 1 and the morphological measurements are listed in Table 1.

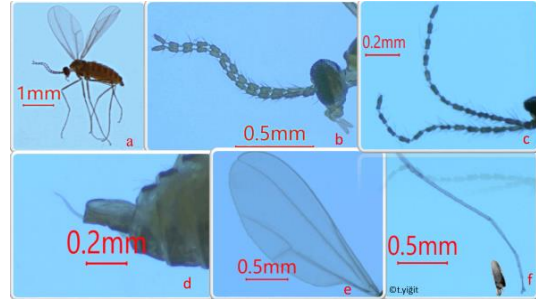


Figure 1. Adult female of *Contarinia pruniflorum* a- general appearance, b- head and antennae, c- general view of antennae, d- posterior segments of abdomen and ovipositor, e- wings, f- tarsus and pretarsus

Şekil 1. *Contarinia pruniflorum*'ün ergin dişisinin a- genel görünümü b- baş ve anten c- antenin genel görünümü, d abdomen sonu ve oviporizatör, e- kanat, f- tarsus ve pretarsus

Adult male

The average body width of the adult male is 0.34 mm and its length without antennae is 1.68 mm, with an orange-red body color. The head, thorax and legs are black. At the end of the abdomen there is a pair of hook-shaped holders that help with mating. The male's antenna is about 1.95 mm long and consists of 24 segments. The antennal segments are rounded and the flagellum consists of two fused parts. There are irregular and long hairs on the segments. The wings of the adult male are about 0.69 mm wide and 1.93 mm long, transparent and sparsely veined. Some body parts of the adult male are shown in Figure 2, and the morphological measurements are given in Table 1.

Larva

Mature larvae hatched from the bud after feeding were collected and measured in the laboratory. The results are shown in Table 2 and Figure 3. The hatched legless larva is initially transparent and whitish. Later it becomes lemon yellow. The average width of the mature larva is 0.49 mm and its length is 2.41 mm.

Pupa

The pupa is barrel-shaped, with an average width of 1.09 mm and a length of 2.22 mm. The larva transforms into a pupa in the course of the summer.

In the pupal stage it remains in the soil until the end of February, the end of the following winter. With the warming of the weather and the soil, the adult insect emerges from the pupa and begins its adult

activities. The morphological measurements of the pupae are shown in Table 3 and its general appearance can be seen in Figure 4.

Table 1. Morphological measurements of adult females and males of *Contarinia pruniflorum* (mm)

Çizelge 1. *Contarinia pruniflorum*'un ergin dişi ve erkeğinin morfolojik ölçümleri (mm)

	Width	Length	Antenna Length	Wing Width	Wing Length
Adult female (n 15, average)	0.43±0,047	1.82±0,160	0.91±0,109	0.74±0,072	2.00±0,116
Adult male (n 12, average)	0.34±0.113	1.68±0.301	1.95±0.255	0.69±0.072	1.93±0.105

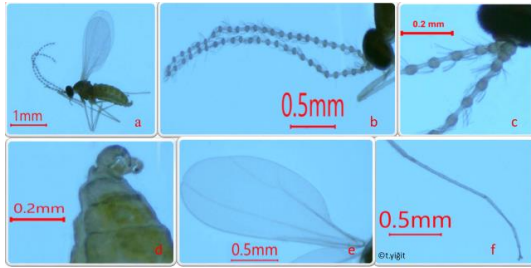


Figure 2. Adult male of *Contarinia pruniflorum* a- general appearance, b- general view of the antennae, c- antennal base and first segments, d- posterior segments of the abdomen and genital tip, e- wings, f- tarsus

Şekil 2. *Contarinia pruniflorum*'un ergin erkeğinin a- genel görünümü b- antenin genel görünümü, c- anten kaidesi ve ilk segmentleri, d- abdomen son segmentleri ve genital uç, e- kanat, f- tarsus

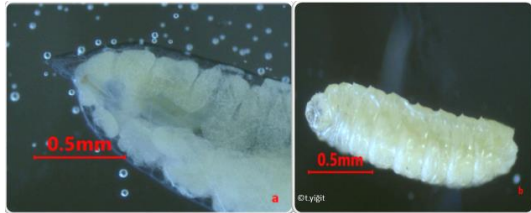


Figure 3. Mature larva of *Contarinia pruniflorum* a- head, sternal spatula, and first segments b- general appearance

Şekil 3. *Contarinia pruniflorum*'un olgun larvasının a- baş, sternal spatula ve ilk segmentleri b- genel görünüm

Table 2. Morphological measurements of the mature larva of *Contarinia pruniflorum* (mm)

Çizelge 2. *Contarinia pruniflorum*'un olgun larvasının morfolojik ölçümleri (mm)

	Width	Length
n 15, average	0.49±0.067	2.41±0.279



Figure 4. General appearance of the pupa of *Contarinia pruniflorum*

Şekil 4. *Contarinia pruniflorum*'un pupasının genel görünümü

Table 3. Morphological measurements of the pupa of *Contarinia pruniflorum* (mm)

Çizelge 3. *Contarinia pruniflorum*'un pupasının morfolojik ölçümleri (mm)

	Width	Length	Circumference
n 15, average	1.09±0.91	2.22±0.158	5.36±0.268

Discussion and Conclusion

Limited studies have been carried out to determine the morphological characteristics of the apricot flower midge (Rambier and Coitin, 1955; Kaplan and İnal, 2021). This study contributed to the literature by making a detailed study on the pest.

The apricot flower midge is a pest that is not recognised by growers due to its small distribution area in the world. To date, it has been detected in a few regions in Europe (Pollini and Bariselli, 1996; Gagne, 20014; 2017; Montuschi et al. 2004; Tsagarakis and Mitsopoulos, 2007; Doğanlar et al. 2014). Apricot growers in Türkiye have recently been confronted with this pest. The first point of view regarding the reason for the new occurrence of the pest could be the expansion or change of the distribution areas of the pest with the climatic

changes. The second point of view is that the pest was already present in the growing areas but was not noticed because the adult period of the pest is short, the period of adult emergence in nature is in the winter months and the population density is low and does not cause significant damage to the products. Yiğit and Tunaz (2021), in their study conducted in the Eastern Anatolia Region of Türkiye, detected the pest at different altitudes, but it caused damage to the crop only at low altitudes. Although the second approach seems more logical, more research on the distribution areas of the pest is needed to explain this issue.

The apricot flower midge has a direct impact on crop yields due to the damage it causes. Pest control measures should be started as soon as the adults emerge from the pupae (Yiğit and Tunaz, 2021). This is because when the damage is noticed at the end of the flowering period, it is too late for pest control. The pest should be controlled during the adult period. It is therefore very important to know the morphology of the adults. As the pest causes damage during the flowering period, control methods other than chemical control must be developed to protect both the existence of the pollinators and the natural balance.

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