

## PARASITOIDS OF *CHLOROPHORUS DAMASCENUS* (CHEVROLAT) (COLEOPTERA: CERAMBYCIDAE) IN VINEYARDS OF SOUTHEASTERN ANATOLIA REGION

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### Abstract

The survey was conducted during the period 2019-2022 in the vineyard areas of Diyarbakır, Mardin, Elazığ, Batman, and Şanlıurfa provinces. Studies were carried out to identify parasitoids of the wood-tissue pest *Chlorophorus damascenus*, which has recently become a problem in vineyard areas that are old and exposed to stress factors. *Dolichomitus populneus* (Ratzeburg, 1848) (Hymenoptera: Ichneumonidae), and *Iphiaulax impostor* (Scopoli, 1763) (Hymenoptera: Braconidae) were obtained from *Chlorophorus damascenus*. *C. damascenus* was a new host for *D. populneus*.

KEY WORDS: *Chlorophorus damascenus*, *Dolichomitus populneus*, *Iphiaulax impostor*, Southeastern Anatolia Region, Turkey

### Introduction

The family Cerambycidae is known as longhorn beetles, longhorns, kids, locust beetles, timber beetles, round-headed borers, or saw beetles (bockkäfer) because of their long antennae. It is an economically important family (Kariyanna *et al.*, 2017) It is one of the families with the highest number of species in the order Coleoptera. Long antennae and rather elongated are used as general diagnostic features for them. They are generally distributed in mountainous areas up to 4,200 m above sea level, where their host plants are found. Most cerambycid insects are phytophagous. Many species are significant pests of forest and city trees. The larval stages of species in the Cerambycidae family may show different behaviors. Most species feed on dead, dying, or even rotting wood, but some may use living plant tissue. The larvae of several species move freely in the soil, feeding on roots from the outside or tunneling under the root crown. Most adult cerambycids, especially the brightly colored ones, feed on flowers. In general, adult nutritional

requirements are variable; some species feed on sap, leaves, flowers, fruits, bark, and fungi, not usually associated with a larval host, while others feed on little or no food, except in water (Monné & Hovore, 2005; Özdikmen, 2021). *Chlorophorus damascenus* (Chevrolat, 1854) is an extremely important pest for fruit trees. The larvae feed on the branches of the host tree and pupate. Adults feed on leaves and bark (Bolu *et al.*, 2010).

*C. damascenus* is distributed in Cyprus, Egypt, Greece (Rhodes Island), Israel, Iraq, Jordan, Lebanon, Syria, and Türkiye. Therefore, it has a Mediterranean chorotype (Özdikmen & Cihan, 2016; Danilevsky, 2019). For many years, *C. damascenus* was designated a subspecies of *Chlorophorus varius* (Müller, 1776). Recent studies have shown that it is a different species (Özdikmen & Cihan, 2016). Morphological identification, hosts, and distribution characteristics in Turkey were made by Özdikmen and Cihan (2016). *C. damascenus* has reddish legs and antennae. The legs and antennae of *C. varius* are black. As a result, it is easy to distinguish between the two (Ataş *et al.*, 2022).

The family Ichneumonidae (Hymenoptera), commonly known as ichneumon wasps or Darwin wasps, is a very large parasitoid group in the insect order Hymenoptera in terms of number of species. Ichneumonids help in controlling insect numbers by eliminating many insects before they reach the reproductive stage. With 25,285 described species in 1,601 genera, as listed in the catalogue of Yu *et al.* (2016), parasitoid species belonging to the Ichneumonidae family make it one of the richest families in the world in terms of distribution and diversity. (Spasojevic *et al.*, 2018). The number of Ichneumonidae species in Turkey is increasing day by day thanks to the studies carried out (Özdemir, 1996; Yurtcan *et al.*, 1999; Çoruh *et al.*, 2002; Özbek *et al.*, 2003; Çoruh *et al.*, 2005).

Braconidae is a family of parasitic wasps in the order Hymenoptera. It constitutes 21,221 described species in 1,103 genera. Species in the family are mostly tropical and subtropical (Yu *et al.*, 2016). Members of this family are usually black, red, orange, and/or white. These species are small to medium-sized insects; females have large ovipositors (Sharkey, 1993). Most Braconidae species are idiobiont ectoparasitoids whose larvae have a habit of feeding on xylem and stem. Several species are known to parasitize hidden fly and sawfly larvae. Several genera are also known to be endoparasitoids of Lepidoptera pupae (Van Achtenberg, 1980). Accordingly, Holometabola represents a great and powerful biological weapon against pests in the insect orders Coleoptera, Diptera, Hymenoptera, and Lepidoptera (Baird, 1958; Lewis *et al.*, 1990).

The aim of this study was to identify parasitoids of *Chlorophorus damascenus*, a wood-tissue pest that has become a problem in vineyard areas, and to contribute to biological control.

## Material and Methods

The samples were collected from Kocaköy, Yenişehir and Sur (Diyarbakır), Arıcak (Elazığ), Mazıdağı (Mardin), Gercüş (Batman), and Siverek (Şanlıurfa) vine stems by cutting the root crown and stem up to 90-100 cm in length in length (Fig. 1). The samples were 20-30 cm to fit their containers and cut into pieces and put in clear plastic boxes. The stems and branches with growth retardation or drying were brought to the laboratory and grown in a climate chamber (26±2°C, 55-60% relative humidity). *Iphiaulax impostor* (Fig.3), and *Dolichomitus populneus* (Fig. 4) were obtained as parasitoids. *D. populneus* was described by Saliha Çoruh (Erzurum Atatürk University, Faculty of Agriculture, Department of Plant Protection). *I. impostor* was identified by Ahmet Beyarşlan (Bitlis Eren University). The host pest was identified by Hüseyin Özdikmen (Gazi University, Faculty of Arts and Sciences, Department of Biology). Samples collected are kept in the Entomology Laboratory of the Diyarbakır Plant Protection Research Institute (Diyarbakır, Türkiye).



Figure 1. Study areas in Turkey: Diyarbakır, Elazığ, Mardin, Şanlıurfa and Batman.

## Results and Discussion

Longhorn beetles are one of the easily recognized insect families due to their antennae and distinctive coloration. Cerambycid species are the most common insect species in collections. Pre-adult stages feed on wood tissue. This feeding results in tunnels in the wood tissue. Because they inhibit transmission in plants, they are considered important pests (Borror, 1981). *C. damascenus* is an extremely important pest of grape vines. The larvae feed and pupate inside the branches and trunk of the host. Adults feed on leaves and fresh shoots. Information about the natural enemy of the species and its distribution is as follows.

Family: Cerambycidae Latreille, 1802

### ***Chlorophorus damascenus* (Chevrolat, 1854) (Fig. 2)**

General distribution: Asia Minor, Caucasus, Cyprus, Europe, Middle East (Iraq, Jordan, Lebanon, Israel), northern Iran, south-western Siberia (Urals), Transcaucasia, western part of North Africa (Egypt) (Sama *et al.*, 2010).

Distribution in Turkey: The species is apparently widely distributed in Turkey. Izmir (Demelt & Alkan, 1961; Gül-Zümreoğlu, 1975); Adana, İçel, Karaman, Niğde (Özdikmen, 2006); Antalya, Niğde (Özdikmen & Demir, 2006); Şanlıurfa, Elazığ, Diyarbakır, Mardin (Ataş *et al.*, 2022).

Host plant: Polyphagous in deciduous trees and herbaceous plants. *Chlorophorus damascenus* (Chevrolat) on *Ficus carica* L. (Demelt & Alkan, 1961; Gül-Zümreoğlu, 1975); *Vitis vinifera* L., *Elaeagnus angustifolia* L., *Quercus coccifera* L., *Cistus* sp. (Ataş *et al.*, 2022).

Natural enemy: *Iphiaulax impostor* (Scopoli, 1763) (Bolu *et al.*, 2010) (Fig. 3). Four parasitoids are reared from six adult *C. damascenus* emerged from the branches and trunk collected from *Vitis vinifera* from Diyarbakır (38° 13' 30" N, 39° 45' 24" E, at an altitude of about 828 m *Dolichomitus populneus* (Ratzeburg, 1848) (Fig. 4.) two parasitoid are reared from four adult *C. damascenus* emerged from the branches and trunk collected from *Vitis vinifera* from Mardin (37° 24' 32" N, 40° 27' 05" E, at an altitude of about 1,029 m).

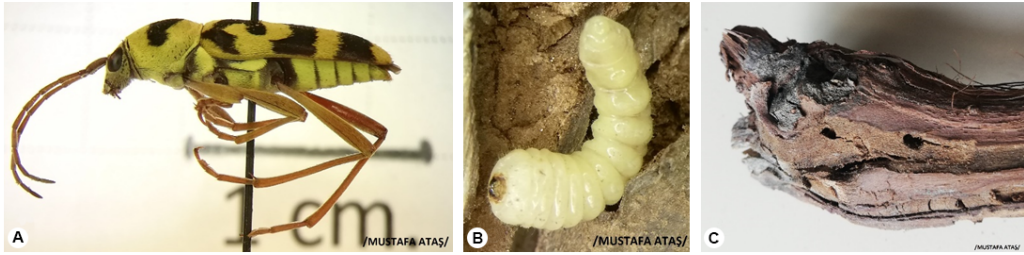


Figure 2. *Chlorophorus damascenus* (A) Adult, (B) Larvae, (C) Example of damage.

Family: Braconidae Nees, 1811

***Iphiaulax impostor* (Scopoli, 1763)**

Hosts pest: *Acanthocinus aedilis* (L.); *Acanthoderes clavipes* (Schrank), *A. varius* (F.), *Aegomorphus clavipes* (Schrank), *Anthaxia morio* (F.), *Apriona germarii* (Hope); *Icosium tomentosum* (Lucas) [on *Tetraclinis articulata* (Vahl) Mast.]; *Leiopus nebulosus* (L.), *Melanophila picta* (Pall.), *Monochamus galloprovincialis* (Olivier), *M. sutor* (L.), *Oberea linearis* (L.), *Plagionotus arcuatus* (L.), *Purpuricenus budensis* (Götz), *Rhagium inquisitor* (L.), *Saperda populnea* (L.) [on *Populus tremula* L.], *Xyleutes persona* (Le Guillou), *Zeuzera leuconotum* (Butler) (Yu et al., 2016).

Associated plants: *Populus tremula* L. *Tetraclinis articulata* (Vahl) Mast. (Yu et al., 2016).

General distribution: Afrotropical, Eastern Palaearctic, Europe, Oriental, Western Palaearctic (Yu et al., 2016).

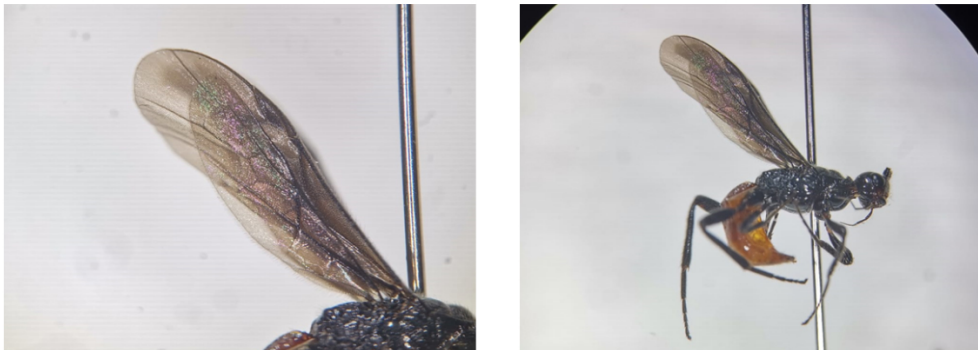


Figure 3. Adult of *Iphiaulax impostor*.

Family: Ichneumonidae Latreille, 1802

***Dolichomitus populneus* (Ratzeburg, 1848)**

Hosts pests: *Catocala nymphaea* (Esper), *C. nymphagoga* (Esper), *Cryptorhynchus lapathi* (L.), *Lampronia fuscata* (Tengström), *Melanophila picta* (Pall.), *Myelois circumvoluta* Fourcroy, *Paranthrene tabaniformis* Rott., *Pennisetia hylaeiformis* (Laspeyres), *Phymatodes pusillus* (F.), *Plagionotus arcuatus* (L.), *Rhagium*

*inquisitor* (L.), *R. sycophanta* (Schrank), *Saperda carcharias* L., *Saperda inornata* Say [on *Populus tremuloides* Michx.], *S. populnea* (L.), [*Populus tremula* Michx. *Salix caprea* L.], *Synanthedon culiciformis* L., *S. flaviventris* (Staudinger), *S. spheciformis* (Denis & Schiffermüller) (Yu *et al.*, 2016).

Associated plants: *Betula* spp., *Populus* spp., *Populus tremula* L., *P. tremuloides* Michx.; *Salix* spp., *Salix caprea* L. (Yu *et al.*, 2016).

Distribution in Turkey: Erzurum, Isparta, Kars (Kolarov & Gürbüz, 2004; Çoruh & Özbek, 2008; Özbek *et al.*, 2009; Çoruh & Kolarov, 2010; Çoruh *et al.*, 2014).

General distribution: Eastern Palaearctic, Europe, Nearctic, Western Palaearctic (Yu *et al.*, 2016).

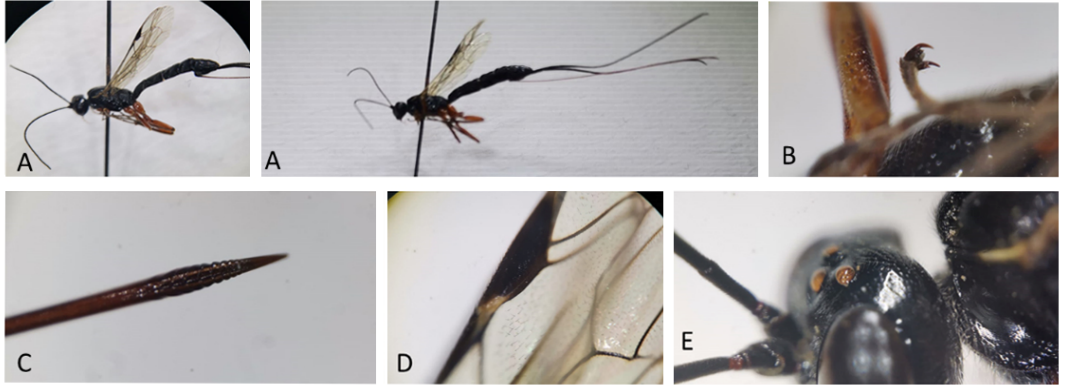


Figure 4. (A) Adult, (B) Tarsus, (C) Ovipositor, (D) Front wing, (E) Ocelli.

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## ПАРАЗИТОИДИ *CHLOROPHORUS DAMASCENUS* (CHEVROLAT) (COLEOPTERA: CERAMBYCIDAE) У ВИНОГРАДИМА ЈУГОИСТОЧНЕ АНАДОЛИЈЕ

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### Извод

Током периода 2019-2022 у виноградарским областима провинција Диарбакир, Мардин, Елазиг, Батман и Шанлијурфа спроведена су истраживања паразитоида на врсти стрижибубе *Chlorophorus damascenus* (Coleoptera: Cerambycidae). Ова штеточина је у последње време постала проблем у старијим виноградима нарочито који су изложени стресним факторима. Врсте *Dolichomitus populneus* (Ratzeburg, 1848) (Hymenoptera: Ichneumonidae), и *Iphiaulax impostor* (Scopoli, 1763) (Hymenoptera: Braconidae) су одгајене из *Chlorophorus damascenus*. Врста *D. populneus* је први пут регистрована из *C. damascenus*.

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