



The larval food-plant of *Agonopterix dideganella* (Amsel, 1972) (Lepidoptera: Depressaridae) and its new larval parasitoid *Copidosoma sosares* (Walker) record

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Abstract

In this study, host-plant *Prangos* sp. and larval parasitoid *Copidosoma sosares* of *Agonopterix dideganella* has been detected for the first time. Also, *C. sosares* is reported as a new record for Chalcidoidea fauna of Turkey. Besides, photos of development stages of *A. dideganella* with its host plant, parasitoid and habitat are presented in the study.

Key words: *Agonopterix dideganella*, *Copidosoma sosares*, *Prangos*, Nemrut Caldera, Bitlis, Turkey

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***Agonopterix dideganella* (Amsel, 1972) (Lepidoptera: Depressaridae)'nın larva besin bitkisi ve yeni larva parazitoidi *Copidosoma sosares* (Walker)'in kaydı**

Özet

Bu çalışmada, *Agonopterix dideganella*'nın larva parazitoidi *Copidosoma sosares* ve konukçu bitkisi *Prangos* sp. ilk kez için tespit edilmiştir. Öte yandan, *C. sosares* Türkiye'nin Chalcidoidea faunası için yeni bir kayıt olarak rapor edilmektedir. Ayrıca, *A. dideganella* gelişim aşamaları ile konukçu, parazitoid ve habitat resimleri çalışmada sunulmuştur.

Anahtar kelimeler: *Agonopterix dideganella*, *Copidosoma sosares*, *Prangos*, Nemrut Kalderası, Bitlis, Türkiye

1. Introduction

Depressaridae is now regarded as a family group in Gelechioidea (Heikkilä et al., 2014). The genus of Depressaridae *Agonopterix* was established by Hübner (1825) and it has 51 species in Turkey (Koçak and Kemal, 2018; Buchner, 2017a). *Agonopterix dideganella* was described in Iran by Amsel (1972). Later, Buchner (2017b) discovered the species in Gümüşhane, Erzincan and Elazığ Provinces in Turkey. In literature, there are few relevant data about the species.

The genus *Prangos* has 19 taxa in Turkey (Menemen, 2012: 75-76). It is known with two species from Nemrut Caldera (Bitlis Prov.); *P. uloptera* Dc. and *P. pabularia* Lindl. (Herrnstadt and Heyn, 1972). The plant is important in point of the roots of *P. pabularia* Lindl. (as called "Çakşır" locally in Turkish) has been used in increasing body resistance, infertility, gastrointestinal disturbances, indigestion, giving strength, diabetes and sperm formation (Korkmaz and Karakurt, 2015).

The genus *Copidosoma* includes species that have a potential to be used as biocontrol agents of lepidopteran pests and has more than 200 species (Guerrieri and Noyes, 2005; Noyes, 2018). *Copidosoma sosares* is a specialized polyembryonic parasitic wasp native to Europe and attacks Depressariine moths that feed on plants in the family Apiaceae. Host range of *C. sosares*, which is limited to a few species belong to *Agonopterix* and *Depressaria* that these species are; *A. angelicella*, *A. heracliana*, *A. nervosa*, *A. perstrigella*, *D. angellicella*, *D. daucella*, *D. nervosa*, *D. pastinacella* and *D. petasitis*. These species are special herbivores of plants within the Apiaceae genera *Angelica*,

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Heracleum, *Oenanthe* and *Pastinaca* (Noyes, 2018). Although *Copidosoma sosares* native to Europe its presence in North America was reported in last decade (Carroll et al., 2007).

In this study, the larval food-plant of *A. dideganella* and its larval endoparasitoid (*C. sosares*) have been detected for the first time. Besides, the study has contributed to distribution of *C. sosares* from Turkey.

2. Materials and methods

While the larvae were feeding on *Prangos* plant, they were collected from Nemrut Caldera (Bitlis Prov.) in Yayla Kalıntısı upper road (38°36'34.20"K 42°15'53.95"D, 2421 m) locality by the first and third authors on 25.05.2017 (Figures 1, 2). Later, they were taken to feeding boxes under laboratory conditions (Figure 3). After a while, it is observed that some of the larvae got parasitized and stopped feeding and were transferred to separate boxes (Figure 4a). The adult depressarids emerged pupas were stretched in the form of museum material, and its genital was prepared by made the first author (G.P. 269 K.A) according to Robinson (1976) (Figures 4b, c, d). Parasitoid *C. sosares* specimens emerging from parasitized larvae were kept in %70 alcohol and identified by the second author by according to Guerrieri and Noyes (2005), Noyes and Hayat (1984), Noyes (2018) (Figure 5).

3. Results

In this study, 39 larvae of *A. dideganella* were collected from Nemrut Caldera on 25.05.2017, and they were put in the feeding boxes. Of the 39 larvae, 8 larvae got parasitized, 3 larvae died while 28 larvae pupated on 29-30.05.2017. The 8 parasitized larvae were kept in separate boxes. And, the parasitoids (*C. sosares*) emerged from the 8 parasitized larvae on 23-24.06.2017. Furthermore, only 17 adult depressarids emerged from the 28 pupae on 18-19.06.2017 (Table 1).

Table 1. The numbers of specimens belong to *Agonopterix dideganella*

	Number of larvae forming pupae	Number of parasitized larvae	Dead larvae
	28	8	3
Not emerged pupae	11		
Emerged pupae	17		

It was observed that larvae of *A. dideganella* died because they could not feed. As the larvae of *A. dideganella* were fed they were moving towards into the plant and fed in collectively. When *A. dideganella* were collected from the field they formed a communal tent and were fed under this property. There was a tendency to form the pupae through plant.

4. Conclusions and discussion

The genus *Prangos* is known to have two species (*P. uloptera* Dc. and *P. pabularia* Lindl.) from Nemrut Caldera (Bitlis Prov.) (Herrnstadt and Heyn, 1972). When the larvae were collected, *Prangos* plant was young and did not have any fruit. So, which species of the *Prangos* the larvae feed on could not be detected as these two species are distinguished from fruit type (Murat Kurşat pers. com.) (Fig. 2).

Copidosoma sosares; head and thorax with dark green reflections, gaster black with metallic green reflections, antenna, venation, legs brown; antenna with scape about 7 times as long as broad, F1 about 1-5 times as long as broad, clava solid, apical truncation of clava extending not more than 0,5 times its length; mesoscutum and scutellum with same sculpture; gaster with ovipositor not exerted.

C. sosares mostly prefers species of Depressaridae feeding on Apiaceae: *Agonopterix angelicella* on *Angelica sylvestris*, *A. heracliana* on *Pastinaca obliva*, *A. nervosa* on *Oenanthe crocata*, *A. petasitis*, *A. perstrigella*, *Depressaria daucella*, *D. pastinacella* on *Heracleum sosnowskyi*, on *Heracleum sphondylium*, on *Heracleum antegazzianum* and on *Heracleum trachytoma*. *C. sosares* is a polyembryonic parasitic wasp and is reported to be polyembryonic our study. These results suggest that *C. sosares* and its host *A. dideganella* should be studied together in detail. Because, it may give important information for biological control studies for both *A. dideganella* and its larval food-plant.

Although *C. sosares* was not used as a biological control agent *C. koehleri* and *C. floridanum* were successfully used as a biological control agent in field. Especially in recent year, there has been a study on *C. sosares* with host plant, host plant chemistry and parasitoid indirect effects in a tritrophic interaction (Ode et al., 2004). Thus host-plant (*Prangos* sp.) and parasitoid (*C. sosares*) relationship and to be new record is important for biodiversity and in terms of suitability for biological control. A new natural enemy record can be base for the control of harmful species.

As a result;

-By now, *A. dideganella* has been only known from Gümüşhane, Erzincan and Elazığ in Turkey (Buchner, 2017b). It is the first record for the Bitlis province with this study.

- The host-plant (*Prangos* sp.) and parasitoid (*C. sosares*) of *A. dideganella* are detected for the first time.

- *Copidosoma sosares* a new record for the Chalcidoidea fauna of Turkey.

More detailed studies are needed to be able to say that it will be possible to use of *C. sosares* as biological control agent and its distribution in Turkey.

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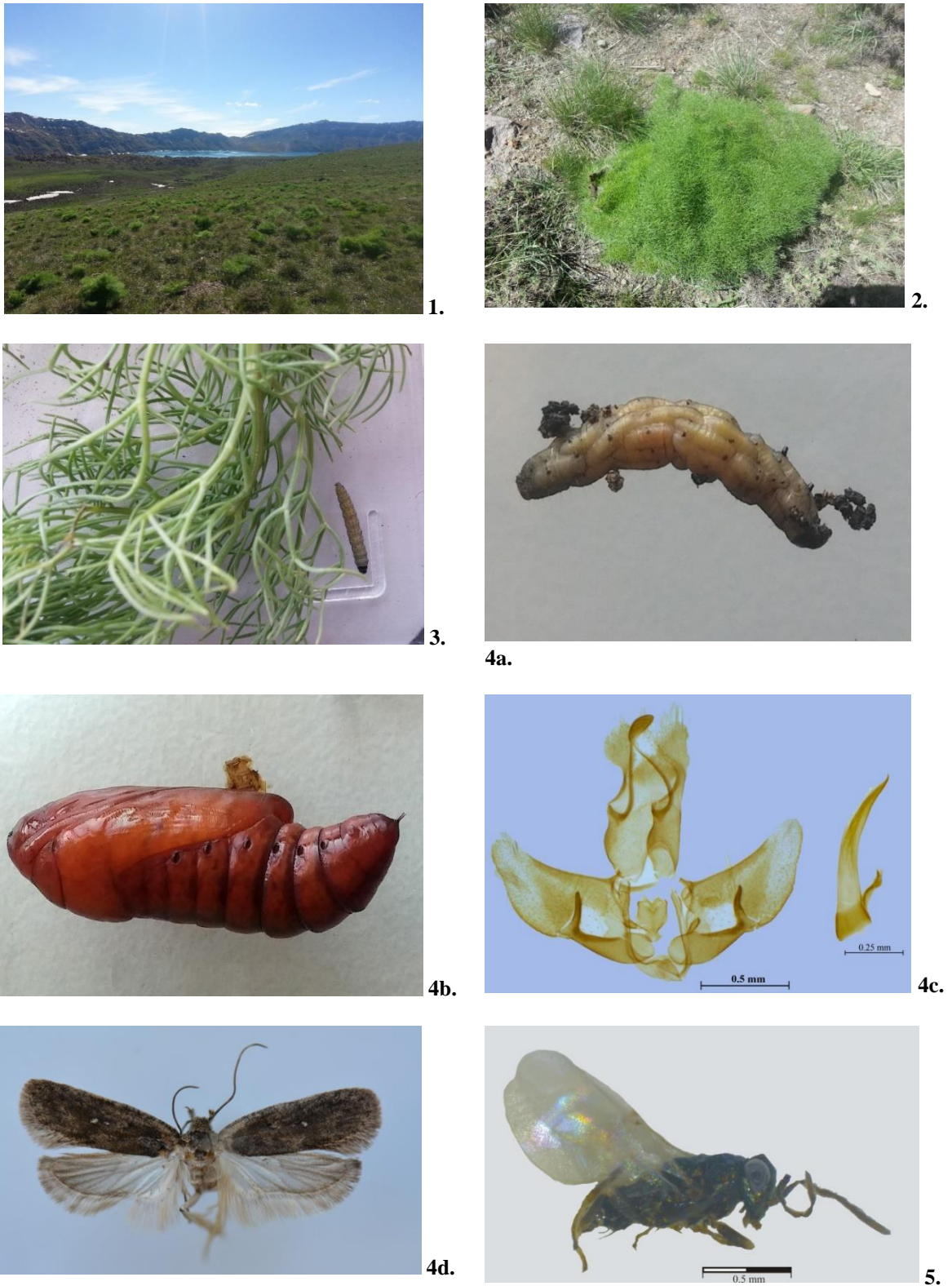


Figure 1. Locality of study, Figure 2. Larva food-plant *Prangos* sp., Figure 3. Larva taken to feeding boxes, Figure 4. *A. dideganella* Ams.: (a: Parasitized larva, b: Pupa, c: Male genital, d: Adult), Figure 5 Adult of *C. sosares* Walk.

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