Tachinid Parasitoids (Diptera: Tachinidae) of *Spodoptera exigua* in Cotton Fields in Diyarbakır,Turkey

Levent Efil*,[1] and Kenan Kara[2]

Tachinid parasitoids *Exorista xanthaspis* (Wiedemann), *Nemorilla maculosa* (Meigen), *Palesisa maculosa* (Villeneuve) and *Drino imberbis* (Wiedemann) were obtained from *Spodoptera exigua* (Hübner) (Noctuidae) larvae collected from cotton fields in Turkey. *S. exigua* is a new host record for *N. maculosa*, and *P. maculosa* is recorded from Turkey for the first time.
KEY WORDS: Parasitoids; Tachinidae; *Spodoptera exigua* (Hübner); *Exorista xanthaspis* (Wiedemann); *Nemorilla maculosa* (Meigen); *Palesisa maculosa* (Villeneuve); *Drino imberbis* (Wiedemann); Turkey.

INTRODUCTION

The Tachinidae are the largest family of Diptera, comprising important entomophagous parasitoids. In this respect, tachinids are comparable to the parasitoid families of Hymenoptera (4). Adult tachinids range from 2 mm to over 20 mm in length and vary widely in shape and color. They can be distinguished from most other flies by their well developed subscutellum (postscutellum), and a row of setae on the meron (hypopleuron) (10). This family includes approximately 10,000 species worldwide, of which about 1650 are found in the Palearctic Region (7). All tachinids are endoparasitoids of other arthropods during their larval stage. Their primary hosts are immatures of moths, sawflies and beetles, and adults of beetles and true bugs (10). Because of their role as natural enemies of pests in agricultural and forest ecosystems, some species of tachinids have been the focus of applied biological control studies (5). Some of the hosts of Turkish Tachinidae have been determined (8). The aim of this study was to record the tachinid parasitoids of *Spodoptera exigua* in cotton fields.

MATERIALS AND METHODS

The study was carried out in 2001. Larvae of *S. exigua* were collected from cotton near Bismil, Diyarbakır, on 28 June. Fifty larvae were brought to the laboratory and kept until the tachinid parasitoids emerged. The larvae were reared in boxes containing cotton plants from the same field, and maintained at 25±1°C, 65±5% r.h., 1500 lux illumination, and 16L:8D. The boxes were checked daily. Last instar tachinid larvae left the host caterpillars and transformed into puparia close to the remains of their hosts. Host pupae and tachinid

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[1]Plant Protection Research Institute, Diyarbakır, Turkey. *Corresponding author [Fax: +90-412-2234775; e-mail: efil46@hotmail.com].
[2]Dept. of Plant Protection, Faculty of Agriculture, Gaziosmanpasa University, Tokat, Turkey [e-mail: kkara@gop.edu.tr].

puparia were placed in separate petri dishes containing moistened cotton until the adult moths or flies emerged.

The authority names for Tachinidae species were taken from the Catalogue of Palaearctic Diptera (7).

RESULTS

Subfamily EXORISTINAE

Exorista xanthaspis (Wiedemann, 1830)

Reared material: Bismil, hatching of larvae 02-08.VII.2001, emergence of flies 14-15.VII.2001, 3♂♂,1♀.
Recorded hosts exclusive of Turkey: *Spodoptera exigua* (Hübner) (Lep. Noctuidae), *Glattula pancratii* Cyr. (Lep. Noctuidae), *Dendrolimus pini* (L.) (Lep. Lasiocampidae), *Thaumetopoea pityocampa* Schiff. (Lep. Thaumetopoeidae) (6).
Hosts in Turkey: *Aporia crataegi* (L.) (Lep. Pieridae), *Simyra dentinosa* Freyer (Lep. Noctuidae), *Spodoptera exigua* (8).
Distribution: Europe: Mediterranean Region, Hungary; former USSR: Central European territory, South European territory, Transcaucasus, Soviet Middle Asia, East Siberia; Asia: Mongolia (7).

Nemorilla maculosa (Meigen, 1824)

Reared material: Bismil, hatching of larvae 02-08.VII.2001, emergence of flies 14-15.VII.2001, 2♀♀. *Spodoptera exigua* is a new host record for *N. maculosa*.
Recorded hosts exclusive of Turkey: Numerous Microlepidoptera, rarely also a few Macrolepidoptera (15).
Hosts in Turkey: *Yponomeuta padella* (L.) (Lep. Yponomeutidae), *Sparganothis pilleriana* (Denis & Schiffermüller) (Lep. Tortricidae), *Tortrix viridana* L. (Lep. Tortricidae), *Etiella zinckenella* (Treitschke) (Lep. Pyralidae), *Hellula undalis* (Fabricius) (Lep. Pyralidae), *Autographa gamma* (L.) (Lep. Noctuidae) (8).
Distribution: Europe: Switzerland, Germany, France, Italy, Turkey; former USSR: Transcaucasus, Soviet Middle Asia, East Siberia; Far East; Asia: Israel, Mongolia; Canary Islands (7).

Drino imberbis (Wiedemann, 1830)

Reared material: Bismil, emergence of flies 14-15.VII.2001, 2♀♀.
Recorded hosts exclusive of Turkey: *Spodoptera exigua* in Israel (13), Morocco (6) and Iran (pers. comm. H.-P. Tschorsnig).
Hosts in Turkey: *Malacosoma neustria* (L.) (Lep. Lasiocampidae), Geometridae sp., *Malacosoma castrensis* (Staudinger) (Lep. Lasiocampidae), *Malacosoma franconica* (Denis & Schiffermüller) (Lep. Lasiocampidae), *Arctia caja* (L.) (Lep. Arctiidae), *Phalera bucephala* (L.) (Lep. Notodontidae), *Simyra dentinosa* Freyer (Lep. Noctuidae), *Dasychira fascelina* L. (Lep. Lymantriidae), *Euproctis* sp. (Lep. Lymantriidae), *Autographa gamma*

(L.) (Lep. Noctuidae), *Parocneria terebinthi* (Freyer) (Lep. Lymantriidae) (8).
Distribution: Europe: Italy, Turkey; Soviet Middle Asia; Asia: Israel, Iran; North Africa: Egypt; Canary Islands (7).

Palesisa maculosa (Villeneuve, 1936)

Reared material: Bismil, hatching of larvae 02-03.VII.2001, emergence of flies 14-15.VII.2001, 3♀♀. *P. maculosa* is a new distributional record for Turkey.
Recorded host: *Spodoptera exigua* (Hübner) in Cyprus (1).
Distribution: Israel (7), Cyprus, Turkey (new record).

TABLE 1. Percentage of *Palesisa maculosa*, *Nemorilla maculosa, Exorista xanthaspis* and *Drino imberbis* parasitizing *Spodoptera exigua*

Parasitoids	Specimens (no.)	Parasitization (%)
Palesia maculosa	3	6
Nemorilla maculosa	2	4
Exorista xanthaspis	4	8
Drino imberbis	2	4

The total parasitization rate is 22%.

DISCUSSION

The results showed that 22% of beet armyworm *S. exigua* larvae were parasitized by Tachinidae species (Table 1). Previous studies reported that the parasitization rate of *S. exigua* larvae was 8% (3), whereas the parasitization rate of cotton bollworm (*Heliothis armigera* Hübn.) larvae and pupae was 25% and 48%, respectively, in the same region (2). The beet armyworm is attacked by a large complex of predators, parasitoids and pathogens that can keep their populations below economic injury level (11). It has been shown that up to 46.2% of beet armyworm larvae can be parasitized in south Georgia (12).

Spodoptera exigua causes serious damage to cotton early in the season in some years in the southeast Anatolia region. In such years, farmers apply insecticide sprays to control this pest. In fact, early season insecticide applications are one of the key factors causing increases in beet armyworm populations (9,14), because the insecticides suppress natural enemy populations. Lack of pressure by natural enemies may lead to increases in beet armyworm populations, making conservation of natural enemies a critical factor in management of this pest (11). Therefore, selective insecticides should be utilized against beet armyworm and other pests when necessary in cotton agroecosystems.

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