

RAPID COMMUNICATION

***Tamarixia monesus* (Walker) (Hym.: Eulophidae) parasitoid of *Bactericera tremblayi* (Wagner, 1961) (Hemiptera: Triozidae) in Iran**

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Abstract

Bactericera tremblayi (Wagner, 1961) (Hemiptera: Triozidae) is reported on *Brassica oleracea* var. *capitata* (Brassicaceae) in northwestern Iran. *Tamarixia monesus* (Walker) (Hymenoptera: Chalcidoidea, Eulophidae) was reared for the first time on *B. tremblayi*, and compared with *Tamarixia tremblayi*, another parasitoid of *B. tremblayi*. This is a new record of *T. monesus* from the Middle East.

Key words: fauna, onion psyllid, parasitoid, Tetrastichinae

Introduction

The onion psyllid, *Bactericera tremblayi* (Wagner, 1961) (Hemiptera: Triozidae) is a pest almost exclusively on onion in Iran (Kazemi and Jafarloo 2008). It has been found in Italy (Wagner 1961; Tremblay 1965; Conci and Tamanini 1988), Turkey (Klimaszewski and Lodos 1979), Switzerland (Burckhardt 1983), Greece (Burckhardt 1988), Bosnia-Herzegovina (Đuric and Hrnčić 2010), France (Ouvrard and Burckhardt 2012), Jordan (Ouvrard and Burckhardt 2012), Serbia (Jerinić-Prodanović 2006), Spain (Teresani *et al.* 2015) and Iran (Burckhardt and Lauterer 1993; Kazemi and Jafarloo 2008). *Bactericera tremblayi* attacks different families of host plants especially: Amaryllidaceae, Amaranthaceae, Apiaceae, Asteraceae, Brassicaceae, Caryophyllaceae and Solanaceae (Klimaszewski and Lodos 1979; Burckhardt 1983; Conci and Tamanini 1988; Jerinić-Prodanović 2006; Kazemi and Jafarloo 2008).

Different natural enemies have been reported on *Bactericera* spp. for example Butler and Trumble (2012) reported three predators: *Orius tristicolor* (White) (Hem.: Anthocoridae), *Geocoris pallens* Stål (Hem.: Geocoridae) and *Hippodamia convergens* Guérin-Ménéville (Col.: Coccinellidae) as key natural enemies

of *Bactericera cockerelli* (Sulc) in southern Californian potatoes, tomatoes, and bell peppers. No study has been done on natural enemies of *B. tremblayi* and only *Tamarixia tremblayi* (Hym.: Eulophidae) (Domenichini 1966) has been reared as a solitary nymphal ectoparasitoid of *B. tremblayi* (Tremblay 1965; Zuparko *et al.* 2011). In this paper we report another species of *Tamarixia* in Iran.

The family Eulophidae previously included 122 species in Iran (Hesami *et al.* 2010; Talebi *et al.* 2011; Lotfalizadeh *et al.* 2015; Lotfalizadeh *et al.* 2016; Yarahmadi *et al.* 2016).

Materials and Methods

In our collection of *Brassica oleracea* var. *capitata* in Urmia, West-Azerbaijan province in northwestern Iran, we found populations of psyllids identified as *B. tremblayi*. From these populations some parasitic wasps were reared in the laboratory. Reared microhymenoptera were separated and placed in 75% ethanol for

further examination. Identification was made according to Graham (1987, 1991).

The specimens are deposited in the insect collection of the Department of Plant Protection, Agriculture and Natural Resources of East-Azerbaijan, Tabriz, Iran:

Tamarixia monesus (Walker, 1839)

Aprostocetus monesus (Walker, 1839)

Cirrospilus monesus (Walker, 1839)

Tetrastichus monesus (Walker, 1839)

Tetrastichus pallicornis (Thomson, 1878)

Tetrastichus pallidicornis (Dalla Torre, 1898).

Material examined

Iran, West-Azarbaijan province, Urmia, Nazlu, Sep. 2011, ex *B. tremblayi*, F. Sadeghi-Nasab leg., 11 ♀♀ & 2 ♂♂.

Description

Female – black body, wholly yellow femora and tibiae; antennal clava shorter than whole of funiculus, two basal segments of clava separated, F1 of antennae as long as pedicellus and about 2 times as long as broad; marginal vein of fore wing about 4.5–5.5 times shorter than stigmal vein, speculum of fore wing distinct and extended below marginal vein. Male – the same as female, except: antennae with long setae, antennal scape with ventral plaque medially, pedicellus longer than F1, F1 slightly longer than broad and much shorter than F2, F2–4 two times longer than broad.

Tamarixia monesus is distinct from *T. tremblayi* – another parasitoid of *B. tremblayi* – by the longer marginal vein and mostly yellow legs and other characters listed in table 1.

Geographical distribution

Widely distributed in Europe including Bulgaria, Czech Republic, England, France, Germany, Hungary, Ireland, Italy, Netherlands, Moldova, Russia Slovakia, Slovenia, Sweden, former Yugoslavia; in Asia known only in Kazakhstan (Graham 1991; Zuparko *et al.* 2011; Ouvrard 2012; Noyes 2016). This is the first record of this species in the Middle East and Iran.

Biological association

Bactericera tremblayi (Hemiptera: Triozidae) (new host record); previously reported from *Trioza* sp. (Hemiptera: Triozidae) (Bouček 1966) and *Agromyza reptans* Fallen, 1823 (Diptera: Agromyzidae) (Herting 1978).

Discussion

Tamarixia monesus was found for the first time in Iran, as a parasitoid of the onion psyllid, *B. tremblayi*. Of the genus *Tamarixia*, three species of the genus were listed from the country (see table 2), bringing the total of

Table 1. Comparison of the females and males of two parasitoids of *Bactericera tremblayi* (*Tamarixia monesus* and *T. tremblayi*)

Characters	<i>Tamarixia monesus</i>	<i>Tamarixia tremblayi</i>
Marginal vein length/ Stigmal vein (♀)	4.5–5.5 times	3.7–4.1 times
Femora coloration (♀, ♂)	yellow (occasionally infuscate)	often infuscate broadly
Tibia coloration (♀)	yellow	infuscate medially or broadly black
Ventral plaque of scape situation (♂)	in the middle	slightly above the middle
Coxae coloration (♂)	often yellow	black (at least 3rd partly)

Table 2. Reported *Tamarixia* species from Iran and their biological and geographical distribution

Species	Host	Distribution in Iran (province)	References
<i>Tamarixia monesus</i> (Walker, 1839)	<i>Bactericera tremblayi</i> (Wagner) (Hem.: Triozidae)	West-Azarbaijan	new record
<i>Tamarixia radiata</i> (Waterston, 1922)	<i>Diaphorina citri</i> Kuwayama (Hem.: Psyllidae)	Hormozgan	Hasanpour <i>et al.</i> (2009), Saeedi-Far <i>et al.</i> (2010), Talebi <i>et al.</i> (2011)
<i>Tamarixia upis</i> (Walker, 1839)	<i>Phyllocnistis citrella</i> Stainton (Lep.: Gracillariidae)	Sistan-Baluchestan	Ebrahimi <i>et al.</i> (2009), Yefremova <i>et al.</i> (2007), Talebi <i>et al.</i> (2011)

Eulophidae from Iran to 123 species. It has not been found in adjacent countries (Noyes 2016). In the Middle East it may be found in Turkey where its host is present (Klimaszewski and Lodos 1979).

Most of the known species of *Tamarixia* attack the *Psylloidea* species including *Bactericera*, *Diaphorina* and *Trioza* (Graham 1991; Noyes 2016), and it seems to be a potentially biological control agent of these pests. The reports of *Tamarixia* species on Gracillariidae (Lepidoptera) and Agromyzidae (Diptera) are likely due to errors and need to be confirmed.

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