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First report of *Baryscapus silvestrii* in Calabria, Italy (Chalcidoidea Eulophidae)

Riassunto: *Prima segnalazione di Baryscapus silvestrii in Calabria (Chalcidoidea Eulophidae).*

Viene segnalata per la prima volta la presenza dell'eulofide *Baryscapus silvestrii* Viggiani & Bernardo in Calabria. Adulti della specie sono emersi in settembre 2019 da pupari di *Bactrocera oleae* (Rossi) (Diptera Tephritidae) reperiti in olive precedentemente campionate in un oliveto sperimentale ubicato in località Mirto Crosia, Cosenza.

Abstract: The eulophid *Baryscapus silvestrii* Viggiani & Bernardo is reported for the first time in the Calabria region (Southern Italy). Adults of the eulophid emerged in September 2019 from olive fruit fly *Bactrocera oleae* (Diptera Tephritidae) puparia detected during a survey in an experimental olive grove in Mirto Crosia in Cosenza province.

Key words: Olive grove, olive fruit fly, natural enemies, endoparasitoids, biological control.

INTRODUCTION

Baryscapus Förster, as recognized by Graham (1991), is a large genus of Eulophidae Tetrastichinae (Hymenoptera Chalcidoidea) currently containing 128 species described with a cosmopolitan distribution, usually primary endoparasitoids of the eggs, larvae or pupae of Diptera, Hymenoptera or Lepidoptera (Noyes, 2020). All species develop endoparasitically and, in larger hosts, gregariously (Askew and Shaw, 2005).

Adults of *B. silvestrii*, described as a new species by Viggiani and Bernardo in 2006, were found for the first time in 2000 as gregarious specimens, emerged from puparia of the olive fruit fly, *Bactrocera oleae* (Rossi) (Diptera Tephritidae), collected at Nocera Inferiore (Salerno, Campania region, Southern Italy) (Viggiani *et al.*, 2006). Subsequently, this pupal endoparasitoid was found in some other olive-growing areas of Campania (Bernardo & Guerrieri, 2011); in Trapani province (Sicily region, Southern Italy) during a survey on the parasitization of the olive fruit fly (Giacalone *et al.*, 2011) and in Lazio region (Central Italy) (Sasso *et al.*, 2020). In this contribution, we report for the first

time the finding of this species in Calabria region (Southern Italy).

MATERIALS AND METHODS

Investigations on the olive fruit fly population dynamics were conducted from the beginning of July to the end of October 2019 in an olive grove located in Mirto Crosia, Cosenza province.

In order to obtain *B. oleae* adults needed for subsequent experimental tests, the 132 puparia altogether intercepted during the whole investigation were stored in Petri dishes (60 mm diameter), in standard laboratory conditions (24±1°C, 60±10% RH and L:D 13:11). From two of these puparia, 29 adults (7 ♂♂ and 22 ♀♀) of a chalcid wasp (Hymenoptera) emerged on September, 15. The specimens were examined with the Optech SL stereomicroscope and subjected to a taxonomic determination process, using at the end the description and illustrations by Viggiani and Bernardo for *B. silvestrii* (Viggiani *et al.*, 2006). The same wasps were then placed in a labelled microtube with 90% ethanol and deposited in the collection of the CREA Research Centre for Olive, Fruit and Citrus Crops, Rende (Cosenza).

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RESULTS AND DISCUSSION

The taxonomic determination process led to classifying the wasps emerged from the two *B. oleae* puparia, as specimens of *B. silvestrii*. The identification of the species was confirmed by Dr. Bernardo (Italian National Research Council, Institute for Sustainable Plant Protection, Portici, NA) who analysed some male and female specimens using comparative procedures with known material according to classic morphological methods and molecular protocols (COI, 28S).

The olive fruit fly is the most important carpophagous species and the major key pest in the most olive growing area of the Mediterranean Basin, where it has been responsible for losses of up to 80% of the oil value and 100% of some table olive productions (Daane & Johnson, 2010). In the same olive growing area, most indigenous parasitoids found attacking *B. oleae* are generalist ectoparasitoid chalcidoids, such as *Eurytoma martellii* Domenichini (Eurytomidae), *Pnigalio mediterraneus* Ferrière & Delucchi (Eulophidae), *Cyrtoptyx latipes* (Rondani) (Pteromalidae) and *Eupelmus urozonus* Dalman (Eupelmidae), the latter believed to be a group of species often with hyperparasitoid behavior (Neuenschwander *et al.*, 1986; Daane *et al.*, 2015).

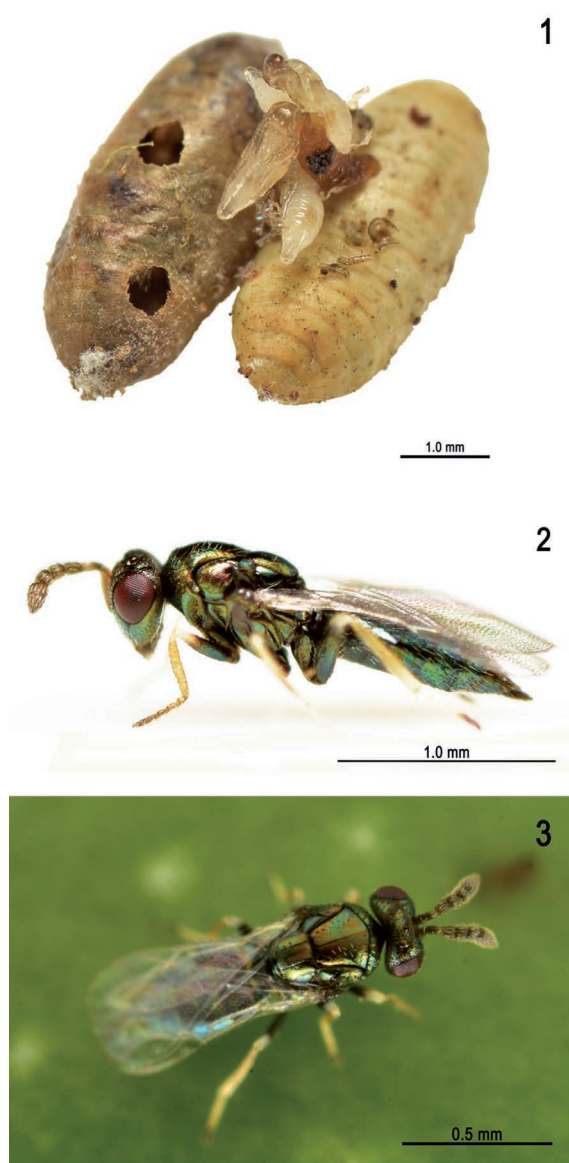
Psytalia concolor (Szépligeti) (Ichneumonidea Braconidae), known endoparasitoid long studied as a possible biological control agent of the tephritid, without however obtaining a concrete and lasting success, is present in many circum-mediterranean olive growing areas, but only in Sicily it reaches significant rates of parasitisation, even in absolute values, both on cultivated and wild olive trees (Caleca *et al.*, 2015).

B. silvestrii parasitizes only the puparia and develops as a primary endoparasitoid with endophagous and gregarious behaviour (Figg. 1-3). The species, able to parasitize and complete its development on the puparia of all ages, has good characteristics to be considered an adequate biological control agent of the olive fruit fly (Sasso *et al.*, 2020).

The discovery of *B. silvestrii* in Calabria, regardless of a parasitisation rate of *B. oleae*, preliminarily estimated at 1.5% (2 puparia out of 132), bodes well for its progressive settlement in the olive growing areas of Central and Southern Italy.

Although to date it has not been possible to highlight high parasitisation rates for the olive fly, the

discovery of *B. silvestrii* also in Calabria has an undoubted ecological significance and deserves further investigation, both in order to identify other likely alternative hosts to the olive fruit fly and as regards the estimation of its role as a limiting factor in the populations of *B. oleae*.



Figg. 1-3. *Baryscapus silvestrii* (Mirto Crosia, Cosenza, Calabria, September 2019, photos P. Rizzo). 1: exit holes and young pupae on two puparia of *Bactrocera oleae*; 2: adult ♀ in lateral view; 3: adult ♂ in dorsal view.

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