



NATURAL HISTORY NOTE

Reproduction of *Trichospilus diatraeae* (Hymenoptera: Eulophidae) parasitizing pupae of *Eupseudosoma involuta* (Lepidoptera: Arctiidae) a lepidopteran defoliator in Brazil

Reproducción de *Trichospilus diatraeae* (Hymenoptera: Eulophidae) parasitando pupas de *Eupseudosoma involuta* (Lepidoptera: Arctiidae) um lepidóptero defoliador en Brasil

BRUNO ZACHÉ*, RONELZA R. C. ZACHÉ & CARLOS F. WILCKEN

São Paulo State University (UNESP), Faculty of Agronomic Sciences, Department of Plant Protection, PO Box 237, Zip code 18603-970, Botucatu, SP, Brazil

*Corresponding author: bzache@bol.com.br

Defoliating caterpillars are the second most important group of pests in eucalyptus plantations in Brazil, only behind leaf-cutting ants. In the past decade new species of eucalyptus defoliating lepidopterans have appeared in the country. *Eupseudosoma involuta* (Seep 1852) (Lepidoptera: Arctiidae) is considered a primary pest of eucalyptus in several regions of Brazil. Balut & Amante (1971) reported its occurrence in *Eucalyptus saligna*, *E. alba*, *E. grandis*, and is considered one of the main pests of eucalyptus in São Paulo state, normally associated with outbreaks in *E. aberrans* (Pereira 1992). It is known that this pest causes damage to the larval stage (caterpillar defoliating), and presents the risk to human health, because it is a stinging caterpillar.

The attacks of defoliating caterpillars cause partial or total defoliation in plants. In the case of eucalyptus, interferes with the rate and balance of internal physiological processes of plants, affecting growth and formation of the biomass of the trunk (Espindola & Gonçalves 2000).

Natural enemies are known to have great impacts on the population dynamics of forest Lepidoptera in various ecosystems (Dwyer et al. 2004). Nevertheless, the relative influence of natural enemies on populations of forest Lepidoptera is highly depending on the species considered (Paritsis et al. 2012).

Eulophidae species are parasitoids (Bennett et al. 1987) or hyperparasitoids (Lioni & Cividanes 2004) and *Trichospilus* Ferrière is a small genus of this family, with eight species

(Boucek 1976). Members of this genus are gregarious parasitoids, mainly of Lepidoptera pupae (Noyes 2003).

The parasitoid *T. diatraeae* has been studied as a potential agent for biological control of pests (Boucek 1976). Parasite of Lepidoptera families: Arctiidae (Paron & Berti-Filho 2000), Oecophoridae (Oliveira et al. 2001), Crambidae (Cherian & Margabanghu 1942), Noctuidae (Etienne & Viette 1973), Pyralidae, (Etienne & Viette 1973, Boucek 1976, Bennett et al. 1987, Zaché et al. 2010b), Nymphalidae (Boucek 1976), Geometridae (Pereira et al. 2008, Bennett et al. 1987, Zaché, et al. 2010a), Pieridae (Torres-Bauza 1994), Riodinidae (Zaché et al. 2011a) e Lymantriidae (Zaché et al. 2011b).

Parasitoids used in this test were collected on pupae of *Iridopsis* sp. (Lepidoptera: Geometridae) in Curvelo, Minas Gerais state, Brazil. *E. involuta* pupae had been reared under room conditions on *E. urophylla* plants in the experiment area of the Forest Pest Biological Control Laboratory, São Paulo State University (Unesp) in Botucatu, São Paulo state, Brazil.

Pupae obtained from that rearing were placed in plastic containers and maintained at 26 ± 2 °C, relative humidity 70 ± 10 %, and a 12-hour photophase. Upon pupation, they were placed individually in glass tubes (2.5 cm diameter, 8.5 cm length); then, 20 pupae were offered to *T. diatraeae* females in a 28:1 (parasitoid:host) ratio for 72 h. Zaché et al. (2010a) described the parasitoid rearing technique in detail.

Thereafter, the females were removed, and containers with *E. involuta* pupae were maintained in a climatic chamber at 26 ± 2 °C, 70 ± 10 % relative humidity and a 14 h photophase, as described by Paron (1999), since the best rearing conditions provide higher progeny and shorter egg-adult duration. The following parameters were determined: level of parasitism, number of emerged and not emerged parasitoids and duration of the egg-adult cycle. The pupae of *E. involuta* were dissected to evaluate the non-emerged parasitoids.

The experimental level of parasitism reached 80 %, with an emergence rate of 80 %. A mean of 89.4 ± 0.9 (SE) parasitoids per pupa emerged in laboratory conditions, while only 1.3 ± 0.4 (SE) parasitoids per pupa did not emerge. Under these conditions the *T.*

diatraeae egg-adult cycle was 19.4 ± 0.8 (SE) days in *E. involuta* pupae. These results demonstrate for the first time, under controlled conditions, the ability of *T. diatraeae* to parasitize the pupae of *E. involuta*, a species of the Arctiidae family (Fig. 1).

In Brazil, its first occurrence was recorded in 1996 on pupae of Arctiidae (Lepidoptera) in Piracicaba, São Paulo state (Paron & Berti-Filho 2000). The parasitoid was reported on pupae of *Cerconota anonella* (Sepp) (Lepidoptera: Oecophoridae) in plantations of the soursop *Annona muricata* L. (Annonaceae) in Planaltina, Distrito Federal (Brazil) (Oliveira et al. 2005).

With regard to biological control of lepidopteran forest pests in Brazil, *T. diatraeae* has found a favorable environment since abiotic factors that affect the performance of this

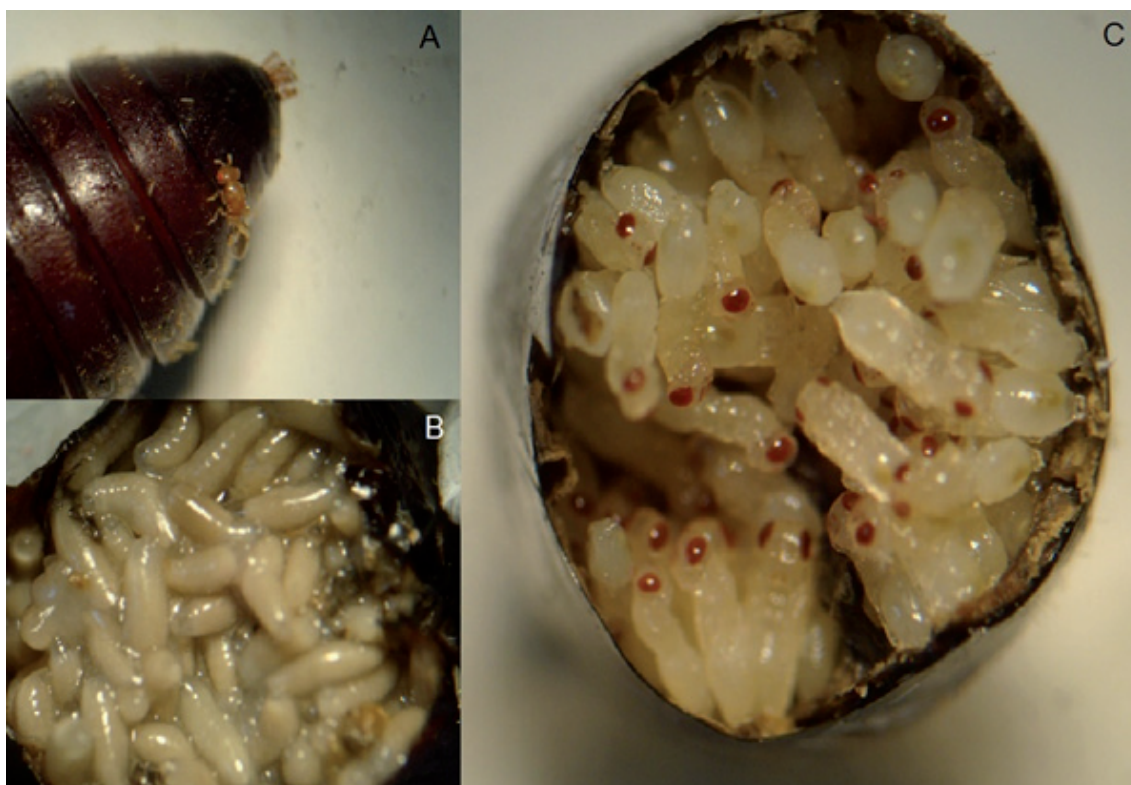


Fig 1. *Trichospilus diatraeae* female parasitizing a *Eupseudosoma involuta* pupa (A); parasitoid larvae within the host (B); the parasitoid pupae (C).

Fig 1. Hembra de *Trichospilus diatraeae* parasitando *Eupseudosoma involuta* pupa (A); larva de los parasitoides en el anfitrión (B); pupa del parasitoide (C).

field are shown in parasitoids advantageous in forest environment of the agricultural environment, since the microclimate forestry, characterized mainly by a reduction of the light that penetrates through the cover of trees, thereby decreasing the temperature inside the culture, increasing moisture, and decreasing the strength of the winds allowing the parasitoid has been established in field. In a forest setting, pupae of *T. arnobia* have been collected on eucalyptus in Minas Gerais state (Pereira et al. 2008).

In 2010, parasitism of *T. diatraeae* was reported in pupae of the eucalyptus-defoliating looper *Melanolophia consimilaria* (Walker) (Lepidoptera: Geometridae), a pest that pupates in the soil and *Hypsipyla grandella* family Pyralidae pest of *Swietenia macrophylla* (Zaché et al. 2010a, Zaché et al. 2010b). In 2011 described the occurrence in *Euselasia eucerus*, a species of the Riodinidae (Zaché et al. 2011a) and *Sarsina violascens* a species of the Lymantriidae (Zaché et al. 2011b) and *Diaphania hyalinata* a species of the Pyralidae (Melo et al. 2011).

In 2102 was described in Eupseudosoma aberrans (Schaus, 1905) (Lepidoptera: Arctiidae), Spodoptera cosmioides Walker, 1858 (Lepidoptera: Noctuidae) (Zaché et al. 2012a, 2012b).

More studies are needed to determine the potential of *T. diatraeae* for the biological control of lepidopteran pests in Brazilian eucalyptus plantations, as this biocontrol agent could possibly reduce the use of chemical and biological insecticides for pest control in eucalyptus.

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