

Technical Note***Musca domestica* as a Host for Mass Rearing of Parasitoid *Palmistichus elaeisis* (Hymenoptera: Eulophidae)**Zaché Bruno¹, Zaché Ronelza Rodrigues da Costa¹, Candelária Murici Carlos¹, Wilcken Carlos Frederico¹¹São Paulo State University (UNESP), Department of Plant Protection, School of Agronomic Sciences, Botucatu, São Paulo, Brazil. Correio eletrônico: bzache@bol.com.br

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Summary

Musca domestica (Diptera: Muscidae), is a potential mechanical vector of etiological agents such as viruses, bacteria, protozoan cysts and larvae of helminthes. It has shown potential as an alternative host for the mass raising of parasitoids. Studies demonstrate the possibility of producing large quantities of hosts in a small space and a short time. *Palmistichus elaeisis* (Hymenoptera: Eulophidae) is a potential parasitoid for insects of different orders. This is the first report of *P. elaeisis* parasitizing pupae of *Musca domestica* in Brazil.

Key words: alternative host, etiological agents, biological control, pupal parasitoid

Resumen***Musca domestica* como huésped para la cría masiva del parasitoide *Palmistichus elaeisis* (Hymenoptera: Eulophidae)**

Musca domestica (Diptera: Muscidae), es potencial vector mecánico de los agentes etiológicos tales como virus, bacterias, quistes de protozoos y larvas de helmintos. Se ha mostrado como un huésped alternativo potencial para la cría masiva de parasitoides. Los estudios muestran la posibilidad de producir grandes cantidades de huéspedes en un pequeño espacio y en tiempo corto. *Palmistichus elaeisis* (Hymenoptera: Eulophidae) es un parasitoide potencial para los insectos de diferentes órdenes. Este es el primer reporte de *P. elaeisis* parasitando pupas de *Musca domestica* en Brasil.

Palabras clave: huésped alternativo, agentes etiológicos, biocontrol, parasitoide de pupas

Introduction

The development of techniques that allow the rearing of natural enemies on a commercial scale is one of the basic requirements for biological control. Among the main natural enemies, parasitoids have been evaluated for their performance in controlling agricultural and forest pests. The success of parasitoids implies compatibility with their hosts (Strand and Pech, 1995; Strand, 2008). Beyond mass production, the study of alternative hosts elucidates the ability of a natural enemy to control the pest population (Pratissoli *et al.*, 2005; Soares *et al.*, 2007).

The ease of rearing *Musca domestica* L. (Diptera: Muscidae) on an artificial diet, and its short life cycle, have rendered it a strong candidate as an alternative host for parasitoid

mass rearing in several biological control programs. Further studies are being carried out to contribute to a better understanding of the host and parasitoid population biodynamic.

M. domestica has shown potential as an alternative host for the mass raising of parasitoids. Research studies on *M. domestica* larvae demonstrate the possibility of producing large quantities of hosts in a small space and a short time (Hou *et al.*, 2007).

Parasitoids are important regulators of insect populations of different orders (Pennacchio and Strand, 2006). The family Eulophidae presents 283 genera and 3,977 species, in tropical and temperate regions, as endoparasitoids or ectoparasitoids, idiobiont or coinobiont, solitary or gregarious, primary or hyperparasitoids, specialists or generalists, and many of these species have been studied and utilized suc-

cessfully in biological control programs (Noyes, 1998; Gauthier *et al.*, 2000; Hansson, 2004).

Tetrastichinae is a major subfamily of Eulophidae, and has as hosts representatives of 100 insect families of different orders (Lasalle, 1993; Lasalle and Schauff, 1995). A new Tetrastichinae species was described as *Palmistichus elaeisis* (Hymenoptera: Eulophidae) and reported in pupae of *Eupseudosoma involuta* (Lepidoptera: Arctiidae), *Euselasia eucerus* (Lepidoptera: Riodinidae) (Delvare and Lasalle, 1993), *Sabulodes sp.* (Lepidoptera: Geometridae) (Bittencourt and Berti, 1999), *Thyriniteina arnobia* and *Thyriniteina leucoceraea* (Lepidoptera: Geometridae) (Pereira *et al.*, 2008) and *Sarsina violascens* (Lepidoptera: Lymantriidae) (Zaché *et al.*, 2012).

The generalist behavior of *P. elaeisis* characterizes this natural enemy as a promising agent for utilization in biological control programs.

The objective of this study was to evaluate the impact of *P. elaeisis* as a pupal parasitoid on *M. domestica* and as a host for mass rearing.

Material and Methods

Parasitoids used in this test were originally collected on pupae of *E. eucerus* (Lepidoptera: Riodinidae) in eucalyptus plantations in Lençóis Paulista, São Paulo State, Brazil, in 2011. Thereafter, a laboratory culture has been maintained, using pupae of *Spodoptera frugiperda* (J. E. Smith) (Lepidoptera: Noctuidae) as hosts. The parasitoid rearing technique was described in detail by Zaché *et al.* (2010) for *Trichospilus diatreae* (Hymenoptera: Eulophidae). Pupae of *M. domestica* were removed from the rearing and placed individually in glass tubes, 4 cm in diameter, closed with «voil», wherein 15 pupae were offered to *P. elaeisis* females at a 5:1 (parasitoid: host) ratio for 72 h. Thereafter, the female was removed and containers with *M. domestica* pupae were maintained in a climate-controlled chamber at 26 ± 2 °C, $60 \pm 10\%$ relative humidity, and a 12 hour photophase. The following parameters were determined: level of parasitism, number of emerged and non-emerged parasitoids and duration of egg-

adult cycle. The *M. domestica* pupae were dissected to evaluate the non-emerged parasitoids.

Results and Discussion

This represents the first report of this species parasitizing *M. domestica* pupae (Fig. 1) and offers new opportunities for research to determine the potential of *M. domestica* as an alternative host for mass rearing.

The level of parasitism reached 80%, with an emergence rate of 60%. It was verified an emergence of 11.3 ± 0.2 parasitoids/individual pupa versus only 0.8 ± 0.2 non-emerged parasitoids. The *P. elaeisis* egg-adult cycle was 17.3 ± 0.4 days in *M. domestica* pupa.

Conclusions

More studies are needed to determine the potential of *P. elaeisis*, given that this biocontrol agent may enable the use of this host in mass rearing.

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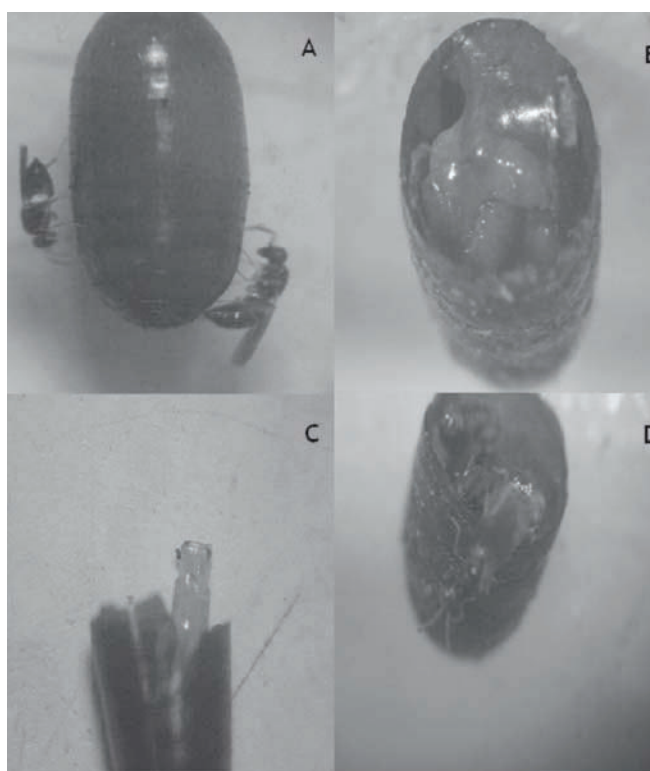


Figure 1. *Palmistichus elaeisis* female parasitizing *Musca domestica* pupa (A); parasitoid larvae within the host (B); the parasitoid pupae (C); parasitoid emergence (D).

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