

Species of Lepidoptera Defoliators of Eucalyptus as New Host for the Parasitoid *Palmistichus elaeisis* (Hymenoptera: Eulophidae)

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ABSTRACT

Pupae of Thyrinteina arnobia (Stoll) and Thyrinteina leucoceraea Rindge (Lepidoptera: Geometridae) were obtained from Eucalyptus cloeziana F. Muell and Eucalyptus urophylla S.T. Blake plants, respectively. Specimens of a parasitoid emerged from T. arnobia pupae and also found parasitizing T. leucoceraea pupae in the field were identified as Palmistichus elaeisis Delvare and LaSalle (Hymenoptera: Eulophidae). This is the first report on P. elaeisis parasitizing T. arnobia and T. leucoceraea pupae in natural conditions in Brazil. P. elaeisis also parasitized these hosts and Bombyx mori Linnaeus (Lepidoptera: Bombycidae), Anticarsia gemmatalis Hubner, Pseudaletia sequax Franclemont, Alabama argillacea Huebner (Lepidoptera: Noctuidae), Dirphia moderata Bouvier (Lepidoptera: Saturniidae) and Halysidota pearsoni Watson (Lepidoptera: Arctiidae) in the laboratory. The production and release of P. elaeisis could be an efficient alternative for controlling Lepidoptera defoliators in eucalyptus plantations.

Key words: Eucalyptus, lepidopterous, parasitoid

Parasitoids are important due to their great diversity and high control levels that they inflict on host populations (Mussury and Fernandes, 2002; Pratisoli et al., 2005). Most of these natural enemies belong to the orders Hymenoptera and Diptera with, approximately, 50.000 species described for the first order (Godfray, 1994; Van Driesche and Bellows, 1996). Chalcidoidea and Ichneumonoidea are the most important groups of the Hymenoptera order in the forests where they parasitize eggs, larvae, pupae and adults of insects, mainly of the orders Coleoptera, Lepidoptera, Diptera and Homoptera (Berti Filho, 1985). The families Ichneumonidae, Braconidae, Scelionidae

and Eulophidae have been the most abundant ones in eucalyptus plantations (Dall'Oglio et al., 2003). The family Eulophidae presents 283 genera and 3977 species in tropical and temperate areas as endoparasitoids or ectoparasitoids; idiobiontes or koinobiontes; solitary or gregarious; primary or hiperparasitoids; specialists or generalists and many of these species have been studied and used with success in programs of biological control (Noyes, 1998; Gauthier et al., 2000; Hansson, 2004). Tetrastichinae is the largest subfamily of Eulophidae with hosts in more than 100 families of insects of different orders (LaSalle, 1993; LaSalle and Schauff, 1995). A species of the

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subfamily Tetrastichinae was described as *Palmistichus elaeisis* (Delvare and LaSalle, 1993). This parasitoid was found in Brazil in *Eupseudosoma involuta* (Sepp) (Arctiidae), *Euselasia eucerus* Hewitson (Riodinidae) (Delvare and LaSalle, 1993) and *Sabulodes* sp. (Geometridae) in eucalyptus plantations (Bittencourt and Berti Filho, 1999). *P. elaeisis* parasitized and developed in *Diatraea saccharalis* (Fabricius), *Anticarsia gemmatalis* Hubner, *Heliothis virescens* (Fabricius), *Spodoptera frugiperda* (Smith) (Noctuidae) and *Thyriniteina arnobia* (Stoll) (Geometridae) at 22°C in the laboratory (Bittencourt and Berti Filho, 1999; 2004).

Thyriniteina arnobia is reared on *Eucalyptus cloeziana* F. Muell plants in the Laboratory of Forest Entomology of the Federal University of Viçosa. Pupae of this species were collected and conditioned in plastic pots of 10 cm diameter by 12 cm height (500 ml) with a screen in the center of its cover and maintained at 25 ± 2°C, relative humidity of 60 ± 10% and photo phase of 12 h. A total of 140 specimens of this parasitoid (first generation) emerged from one of these pupae were maintained in glass pots (12.5 diameter x 17.0 cm height), labeled and covered with woven type organza with a honey drop inside to feed the adults at 25 ± 2°C, relative humidity of 70 ± 10% and photo phase of 14 h. Ten 24 to 72 h old *T. arnobia* pupae were used as host for the parasitoids. The

parasitoids were removed after 24 h and conditioned in alcohol (70%). Forty specimens of this parasitoid were sent to Dr. Marcelo Teixeira Tavares, of the Department of Biological Sciences, of the Federal University of Espírito Santo and to Dr. Christer Hansson, Department of Zoology, Lund University, Sweden, for identification.

The insects were identified as *Palmistichus elaeisis* Delvare and LaSalle (Hymenoptera: Eulophidae). This was the first report of this species parasitizing *T. arnobia* pupae in natural conditions in Brazil. The procedure of rearing *P. elaeisis* was repeated during five generations to guarantee the expression of the biological characteristics of this parasitoid in the laboratory. Twelve pupae of *Thyriniteina leucoceraea* Rindge (Lepidoptera: Geometridae), *Bombyx mori* Linnaeus (Lepidoptera: Bombycidae), *Anticarsia gemmatalis* Hubner, *Pseudaletia sequax* Franclemont, *Alabama argillacea* (Huebner), *Spodoptera frugiperda* (Smith) (Lepidoptera: Noctuidae), *Dirphia moderata* Bouvier (Lepidoptera: Saturniidae) and *Halysidota pearsoni* Watson (Lepidoptera: Arctiidae) (24 to 72 h old) were submitted to the parasitism by adults of sixth generation *P. elaeisis*. Besides the natural host *T. arnobia* (Fig. 1A), *P. elaeisis* parasitized pupae of *P. sequax* (Fig. 1B), *S. frugiperda* (Fig. 1C), *H. pearsoni* (Fig. 1D), *A. argillacea* (Fig. 1E), *A. gemmatalis* (Fig. 1F), *B. mori* (Fig. 1G), and *D. moderata* (Fig. 1H).

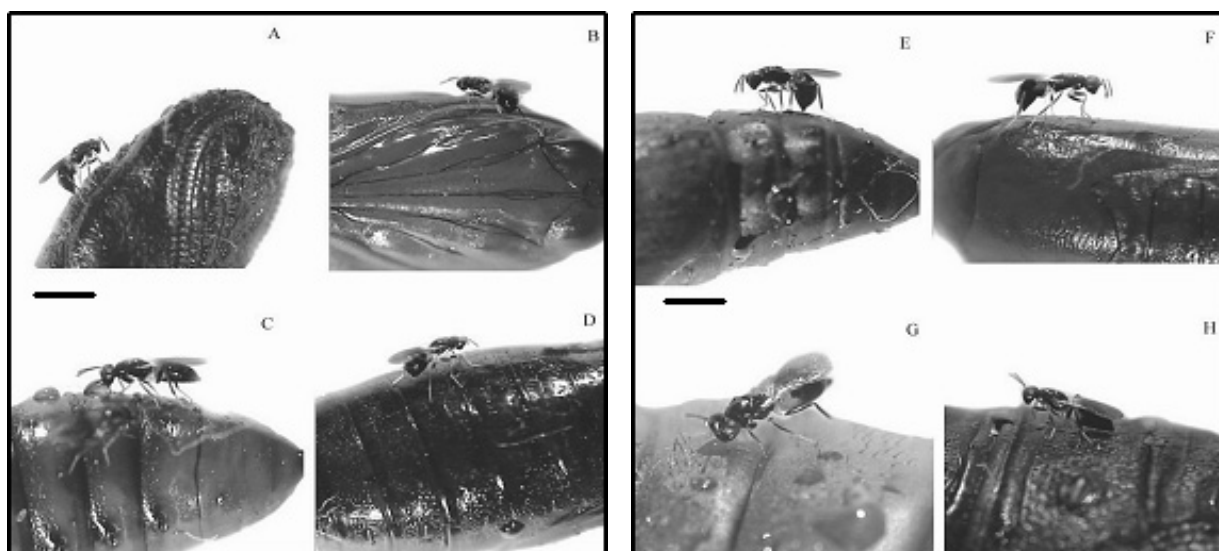


Figure 1 - *P. elaeisis* parasitizing pupae of *T. arnobia* (A), *P. sequax* (B), *S. frugiperda* (C), *H. pearsoni* (D), *A. argillacea* (E), *A. gemmatalis* (F), *B. mori* (G) and *D. moderata* (H). Viçosa, State of Minas Gerais, Brazil. Bars = 1.0 mm

Six adults of the parasitoid *P. elaeisis* were found parasitizing at the same time a *T. leucoceraea* pupae on an *E. urophylla* plant. A total of 194 adults of *P. elaeisis* emerged from this pupa after 23 days. This showed the gregarious behavior of this parasitoid, which was characterized by many larvae developing until maturity in a single host (Marchiori, 2005). *P. elaeisis* completed its cycle (21 to 23 days) with the hosts tested but with different number of adults emerged (63 to 1710 individuals per pupa) depending on the size of the pupa of each Lepidoptera species. This was, also, reported for this parasitoid with pupae of *D. saccharalis*, *A. gemmatalis*, *H. virescens* and *S. frugiperda* (Bittencourt and Berti Filho, 1999, 2004). This information was important because it demonstrated that *P. elaeisis* reproduced and it can be mass reared with hosts, which are easily reared in the laboratory. This species is generalist what may allow it to keep its population in the field even when their primary hosts are at low numbers. This generalist behavior and the high parasitism rate (85 to 100%) of *P. elaeisis* characterize this parasitoid as an efficient agent of biological control. This parasitoid is polyphagous and it turns Lepidoptera pupae unfeasible, what makes important to study it for its use in outbreaks of eucalyptus defoliating caterpillars. The production and release of *P. elaeisis* could represent an efficient alternative to control eucalyptus-defoliating caterpillars due to the occurrence of different species of this group simultaneously.

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RESUMO

Pupas de *Thyrintina arnobia* (Stoll) e *Thyrintina leucoceraea* Rindge (Lepidoptera: Geometridae) foram coletadas em *Eucalyptus cloeziana* F. Muell e *Eucalyptus urophylla* S.T. Blake, respectivamente. Espécimes de *Palmistichus elaeisis* Delvare and LaSalle (Hymenoptera: Eulophidae) emergiram de *T. arnobia* e foram encontrados sobre pupas de *T. leucoceraea* em plantas de eucalipto no campo. Esse é o primeiro relato de *P. elaeisis* parasitando pupas de *T. arnobia* e *T. leucoceraea* em condições naturais no Brasil. Além desses hospedeiros, *P. elaeisis* parasitou em laboratório *Bombyx mori* Linnaeus (Lepidoptera: Bombycidae), *Anticarsia gemmatalis* Hubner, *Pseudaletia sequax* Franclemont, *Alabama argillacea* Huebner (Lepidoptera: Noctuidae), *Dirphia moderata* Bouvier (Lepidoptera: Saturniidae) e *Halysidota pearsoni* Watson (Lepidoptera: Arctiidae). A produção de *P. elaeisis* e sua liberação em eucaliptais podem representar uma alternativa eficiente de controle de lagartas desfolhadoras de eucalipto.

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