BioOne COMPLETE

Palmistichus elaeisis (Hymenoptera: Eulophidae) Parasitizing Pupae of Hypsipyla grandella (Lepidoptera: Pyralidae)

Authors: Zaché, Bruno, Costa, Ronelza Rodrigues Da, Zanuncio, José Cola, and Wilcken, Carlos Frederico

Source: Florida Entomologist, 96(3) : 1207-1208

Published By: Florida Entomological Society

URL: https://doi.org/10.1653/024.096.0369

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 28 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use

PALMISTICHUS ELAEISIS (HYMENOPTERA: EULOPHIDAE) PARASITIZING PUPAE OF *HYPSIPYLA GRANDELLA* (LEPIDOPTERA: PYRALIDAE)

BRUNO ZACHÉ[1,*], RONELZA RODRIGUES DA COSTA[1], JOSÉ COLA ZANUNCIO[2] AND CARLOS FREDERICO WILCKEN
[1]Department of Plant Protection, School of Agronomic Sciences - São Paulo State University (UNESP), 18603-970, Botucatu, SP, Brazil

[2]Department of Animal Biology, Universidade Federal de Viçosa (UFV), 36571-000, Viçosa, MG, Brazil

*Corresponding author; E-mail: bzache@bol.com.br

Hypsipyla grandella (Zeller) (Lepidoptera: Pyralidae) is distributed throughout Central and South America (except Chile), and inhabits many Caribbean Islands and the southern tip of Florida (Schabel et al. 1999). Only 1 caterpillar per tree causes severe damage; and it is the main pest to meliaceous trees. Larvae attack shoots, leaves, stems, fruits and even the trunk of trees of many species of subfamily Swietenoideae, including several mahogany and cedar species (Hilje & Cornelius 2001). Boring in terminal shoots of young big leaf mahogany, *Swietenia macrophylla* King breaks apical dominance, causing forking of the stems and excessive production of lateral branches (Howard & Giblin-Davis 1997; Schabel et al. 1999). The use of systemic insecticides injected into the trunk has shown effective control of *H. grandella*, but chemical control in forest plantations is unfeasible due to potentially adverse environmental effects and high costs (Zanuncio et al. 1994). Thus, biological control through the introduction or augmentation of predators, parasitoids and/or pathogens, could be an important tool (Silva 2000). Taveras et al. (2004) reported 4 parasitoid species in Costa Rica, but their effect on *H. grandella* abundance was negligible.

Palmistichus elaeisis (Delvare & LaSalle 1993) (Hymenoptera: Eulophidae) (Fig. 1) is a generalist and gregarious endoparasitoid of lepidopteran and coleopteran pupae (Menezes et al. 2012). This parasitoid parasitizes pests in eucalyptus plantations such as *Eupseudosoma involuta* (Lepidoptera: Arctiidae), *Euselasia eucerus* (Lepidoptera: Riodinidae), *Sabulodes* sp. (Lepidoptera: Geometridae), *Thyrinteina arnobia*, *Thyrinteina leucoceraea* (Lepidoptera: Geometridae), *Hylesia* sp. (Lepidoptera: Saturniidae), and *Sarsina violascens* (Lepidoptera: Lymantriidae) (Delvare & LaSalle 1993; Bittencourt & Berti Filho 1999; Pereira et al. 2008; Zanuncio et al. 2008; Soares et al. 2009; Zaché et al. 2012).

The objective of this study was to evaluate the parasitism of *P. elaeisis* on *H. grandella* pupae. The experiment was conducted in laboratory conditions.

Parasitoids were originally collected from pupae of *E. eucerus* from eucalyptus plantations at Lençois Paulista, São Paulo State, Brazil, in 2011. Thereafter, a laboratory colony was maintained using *Spodoptera frugiperda* (J. E. Smith) (Lepidoptera: Noctuidae) as the host. *Hypsipyla grandella* was reared under controlled conditions on *S. macrophylla* plants until the pupal stage in a room mantained at 26 ± 2 °C, 60 ± 10% RH and 12:12 h L:D. Pupae were individually placed in glass tubes (14 cm L × 2 cm diam, covered with "voile" fabric) containing 20 mated *P. elaeisis* females fed on pure honey that were placed in-

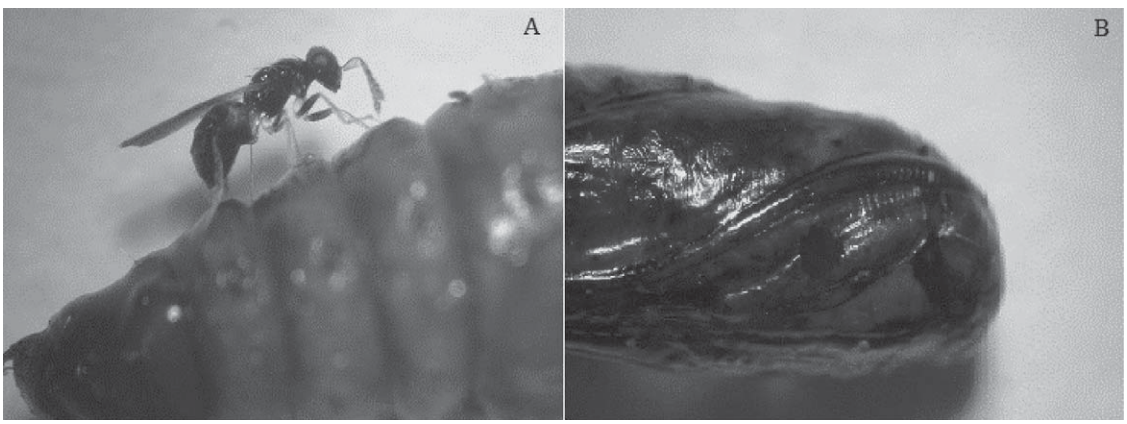


Fig. 1. *Palmistichus elaeisis* female parasitizing a *Hypsipyla grandella* pupa (a); parasitoid emergence hole (b).

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 28 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use

side the tubes 24 h before. Pupae were exposed to parasitoids for 72 h and then placed in plastic trays in a climatized room at 25 ± 2 °C, 70% RH and 12:12 h L:D until adult emergence. Twenty *H. grandella* pupae were exposed to *P. elaeisis*. Parasitoids emerged 24 days later. Parasitism reached 80%, with an emergence rate of 70%; 79.1 ± 1.3 (SE) adult parasitoids emerged per parasitized pupa. The generalist behavior and mass production capabilities characterize *P. elaeisis* as a promising agent for use in control of lepidopteran pests. Research is underway to design mass rearing and release techniques for field evaluations and potential use of *P. elaeisis* in mahogany shoot borer control.

Summary

This is the first report of *Palmistichus elaeisis* (Delvare & LaSalle) (Hymenoptera: Eulophidae), a generalist pupal parasitoid of Lepidoptera and Coleoptera, parasitizing pupae of *Hypsipyla grandella* (Zeller) (Lepidoptera: Pyralidae), a major forest pest in Latin America and the Caribbean. This finding offers new perspectives for the use of parasitoids in biological control programs against pests of mahogany and cedar species in Latin America and the Caribbean.

Keywords: mahogany shoot borer, pupal parasitoid; Eulophidae, plant protection.

Resumo

Este trabalho relata a primeira ocorrência do parasitoide *Palmistichus elaeisis* (Delvare & LaSalle) (Hymenoptera: Eulophidae) um parasitoide de Lepidoptera e Coleoptera parasitando pupas de *Hypsipyla grandella* (Zeller) (Lepidoptera: Pyralidae), Esta descoberta abre novas possibilidades para o uso de parasitoides em programas de controle biológico, visando a gestão desta importante praga de espécies de mogno e cedro, na América Latina e no Caribe

Palavras Chave: broca das meliáceas, parasitoide pupal; Eulophidae, proteção de plantas

References Cited

Bittencourt, M. A. L., and Bertì-Fìlho. 1999. Preferência de *Palmistichus elaeisis* por pupas de diferentes lepidópteros praga. Scientia Agricola, Piracicaba. 56(4): 1281-1283.

Delvare, G., and Lasalle, J. A. 1993. New genus of *Tetrastichinae* (Hymenoptera: Eulophidae) from the Neotropical region, with the description of a new species parasitica on key pests of oil palm. J. Nat. Hist. London 27(1): 435-444.

Hilje, L., and Cornelius, J. 2001. Es inmanejable *Hypsipyla grandella* como plaga forestal ? Manejo Integrado de Plagas (Costa Rica). Hoja Técnica No. 38(18): 1-4.

Howard, F. W., and Giblin-Davis, R. M. 1997. The seasonal abundance and feeding damage of *Hypsipyla grandella* (Lepidoptera: Pyralidae) in seed capsules of *Swietenia mahago*ni in Florida. Florida Entomol. 80(1): 34-41.

Menezes, C. W. G., Soares, M. A., Santos, J. B., Assis Júnior, S. L., Fonseca, A. J., and Zanuncio, J. C. 2012. Reproductive and toxicological impacts of herbicides used in Eucalyptus culture in Brazil on the parasitoid *Palmistichus elaeisis* (Hymenoptera: Eulophidae). Weed Res. 52(6): 479-576.

Pereìra, F. F., Zanunciìo, J. C., Serrão, J. E., Oliveìra, H. N., Fávero, K., and Grance, A. L. 2008. Progênie de *Palmistichus elaeisis* Delvare & LaSalle (Hymenoptera: Eulophidae) Parasitando Pupas de *Bombyx mori* L. (Lepidoptera: Bombycidae) de Diferentes Idades. Neotrop. Entomol. 38(5): 660-664.

Schabel, H., Hilje, L., Nair, K. S. S., and Varma, R. V. 1999. Economic entomology in tropical forest plantations: An update. J. Tropical For. Sci. 11(1): 303-315

Silva, C. A. D. 2000. Microorganismos entomopatogênicos associados a insetos e ácaros do algodoeiro. EMBRAPA-CNPA, Campina Grande, Paraíba. Doc. No. 77.

Soares, M. A., Gutierrez, C. T., Zanuncio, J. C., Pedrosa, A. R. P., and Lorenzon, A. S. 2009. Superparasitism by *Palmistichus elaeisis* (Hymenoptera: Eulophidae) and defense behaviors of two hosts. Rev. Colombiana Entomol. 35(1): 62-65.

Taveras, R., Hilje, L., Hanson, P., Mexzon, R.,Carballo, M., and Navarro, C. 2004. Population trends and damage patterns of *Hypsipyla grandella* (Lepidoptera: Pyralidae) in a mahogany stand, in Turrialba, Costa Rica. Agr. For. Entomol. 6: 89-98.

Zaché, B., Zaché, R. R. C., and Wiìlcken, C. F. 2012. Evaluation of *Palmistichus elaeisis* Delvare & LaSalle (Hymenoptera: Eulophidae) as Parasitoid of the *Sarsina violascens* Herrich-Schaeffer (Lepidoptera: Lymantriidae). J. Plant Studies. 1(1): 86-89.

Zanuncio, J. C., Nascimento, E. C., Garcìa, J. F., and Zanunciìo, T. 1994. Major lepidopterous defoliators of eucalyptus, in the Southeast Brazil. For. Ecol. Mgt. 65: 53-63.

Zanuncio, J. C., Pereira, F. F., Jacques, G. C., Tavares, M. T., and Serrão, J. E. 2008. *Tenebrio molitor* Linnaeus (Coleoptera: Tenebrionidae), a new alternative host to rear the pupae parasitoid *Palmistichus elaeisis* Delvare & LaSalle (Hymenoptera: Eulophidae). Coleopts Bull. 62: 64-66.

Downloaded From: https://complete.bioone.org/journals/Florida-Entomologist on 28 Mar 2024
Terms of Use: https://complete.bioone.org/terms-of-use