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TRICHOSPILUS DIATRAEAE (HYMENOPTERA: EULOPHIDAE): A POTENTIAL BIOLOGICAL CONTROL AGENT OF LEPIDOPTERAN PESTS OF OIL PALM IN THE BRAZILIAN AMAZON

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Oil palm (*Elaeis guineensis*) monoculture may favor insect pests and disease vectors (Gitau et al. 2009). The defoliating caterpillars, *Opsiphanes invirae* Hübner and *Brassolis sophorae* L. (Lepidoptera: Nymphalidae), and the crown-leaf borer, *Eupalamides cyparissias* (Fabricius) (Lepidoptera: Castniidae), affect the development and productivity of this crop in northern Brazil (Vasquez et al. 2008; Ribeiro et al. 2010). Studies involving control methods of these pests are needed.

Trichospilus diatraeae Margabandhu & Cherian (Hymenoptera: Eulophidae) is a pupal parasitoid of many lepidopteran families, such as Arctiidae (Bennett et al. 1987; Paron & Berti-Filho 2000), Crambidae (Bennett et al. 1987), Oecophoridae (Oliveira et al. 2001), Pieridae (Torres-Bauza 1994), Geometridae (Pereira et al. 2008; Zaché et al. 2010; Pastori et al. 2012), Saturniidae (Pastori et al. 2012), Lymantriidae (Zaché et al. 2011a), Riodinidae (Zaché et al. 2011b), Noctuidae and Nymphalidae (Bennett et al. 1987; Zaché et al. 2012).

Female parasitoids must overcome the host's defensive behavior and immune response (Andrade et al. 2010). These factors can affect the biological characteristics and the host choice of parasitoids (Gross 1993; Völkl & Stadler 1996; Farias & Hopper 1999; Walker & Hoy 2003). The objective of this study was to evaluate the potential parasitism of lepidopteran pests of oil palm by *T. diatraeae*.

Opsiphanes invirae, *B. sophorae* and *E. cyparissias* pupae were obtained from oil palms in the district of Tailandia, Pará State, Brazil (S 24° 2.04' W 48° 08.02'). *Trichospilus diatraeae* was reared on *Tenebrio molitor* L. (Coleoptera: Tenebrionidae) pupae at the Federal University of Viçosa, Viçosa, Minas Gerais State, Brazil, at 25 ± 2 °C, 70 ± 10% RH and 12:12 h L:D (Favero 2009). Originally, *T. diatraeae* was obtained from *Thyrinteina arnobia* (Stoll) (Lepidoptera: Geometridae) pupae collected on *Eucalyptus cloeziana* F. Muell. (Myrtales: Myrtaceae) plants (Pereira et al. 2008).

Groups of fifty 2-day old *T. diatraeae* females were placed inside test tubes (14.5 cm H × 2.0 cm diam) together with one pupa of one of the following hosts: *O. invirae*, *B. sophorae* or *E. cyparissias,* for 48 h. The tubes were closed with cotton and parasitoids females fed with a drop of pure honey applied with a surgical needle on the wall of the test tubes (Pereira et al. 2009).

Trichospilus diatraeae parasitized *E. cyparissias* (Fig. 1A), *B. sophorae* (Fig. 1B) and *O. invirae* pupae (Fig. 1C), with parasitism rates of 90%, 100% and 90%, respectively. Releases of this parasitoid may provide an alternative biological control in oil palm crops, where several species of Lepidoptera pests can occur simultaneously (Ribeiro et al. 2010). However, further studies are needed to assess the mobility and dispersal of *T. diatraeae* in the field (Zappalà et al. 2012) and determine whether mass release of this parasitoid could interfere with other natural enemies (Charles 2012).

Trichospilus diatraeae developed in pupae of *O. invirae* and *B. sophorae.* An average of 447.83 ± 51.52 and 669.00 ± 89.62 parasitoid adults/pupa were obtained from these hosts, respectively. These results show the potential of this parasitoid to control defoliators and its possible establishment in the field through inoculative releases (Eilenberg et al. 2001). However, *T. diatraeae* adults did not emerge from *E. cyparissias* pupae probably because of host defense mechanisms (Gross 1993; Pennacchio & Strand 2006). The number of *T. diatraeae* females (50) per *E. cyparissias* pupae may have been insufficient to generate the amount of toxins and immature individuals required to overcome the host defense mechanism (Zaki et al. 1994; Andrade et al. 2010). Encapsulated parasitoids were found inside dissected pupae of *E. cyparissias*.

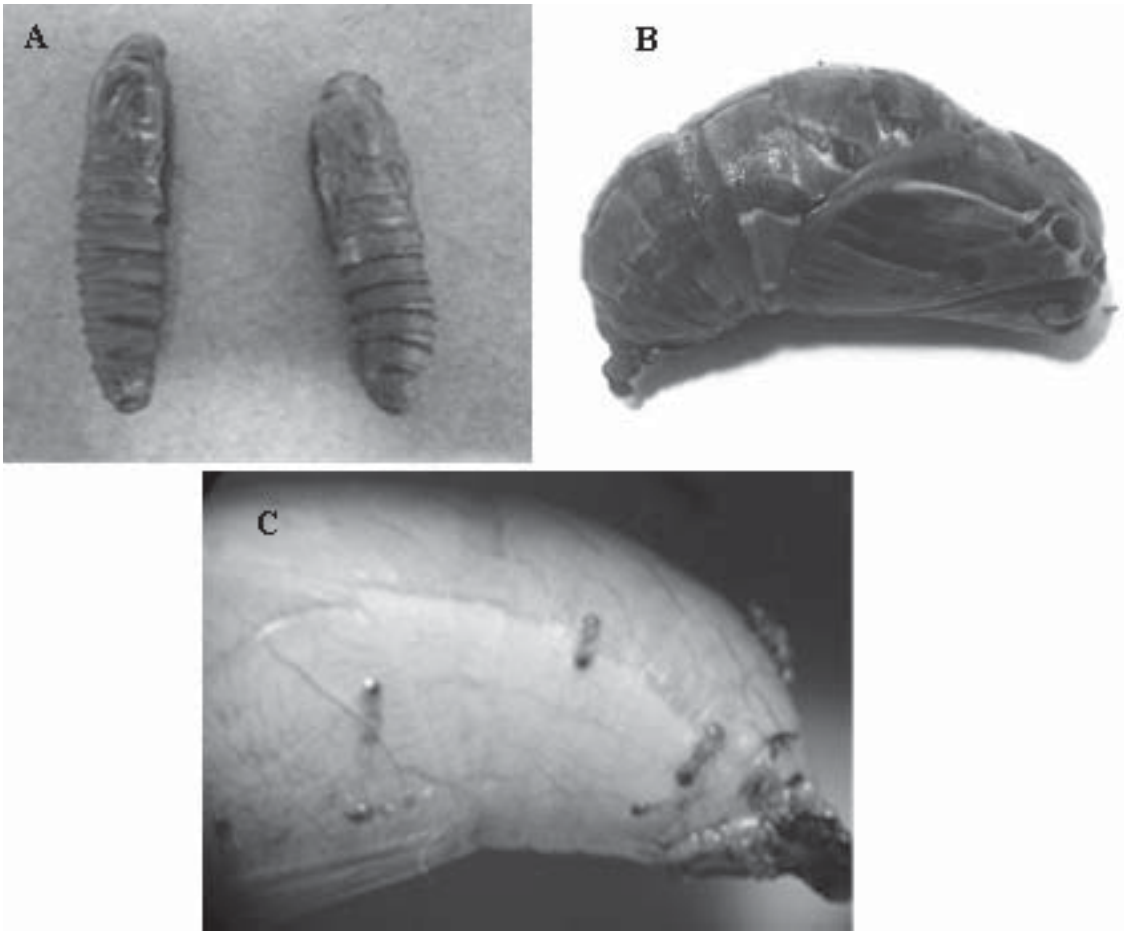

Fig. 1. *Eupalamides cyparissias* (Lepidoptera: Castniidae) (A), *Brassolis sophorae* (B) and *Opsiphanes invirae* (C) (Lepidoptera: Nymphalidae) pupae parasitized by *Trichospilus diatraeae* (Hymenoptera: Eulophidae).

Trichospilus diatraeae can be reared on pupae of the oil palm defoliator caterpillars, *O. invirae* and *B. sophorae,* indicating the potential of this parasitoid for the control of these pests.

Summary

The expansion of oil palm (*Elaeis guineensis*) monoculture may favor insect pests such as the caterpillars of *Opsiphanes invirae* Hübner, *Brassolis sophorae* L. (Lepidoptera: Nymphalidae) and *Eupalamides cyparissias* (Fabricius) (Lepidoptera: Castniidae). The objective of this study was to evaluate the potential of *Trichospilus diatraeae* Cherian & Margabandhu (Hymenoptera: Eulophidae) to parasitize pupae of lepidopteran pests of oil palm. Groups of fifty females of *T. diatraeae* were maintained inside test tubes with one pupa of one of the following hosts: *O. invirae*, *B. sophorae* or *E. cyparissias* for 48 h. *Trichospilus diatraeae* parasitized the 3 Lepidopteran species, but reproduced only on *O. invirae* and *B. sophorae*. These results suggest that this parasitoid, of polyphagous habit, may represent an alternative for the control of lepidopteran pests of oil palm in the Brazilian Amazon.

Resumo

A expansão da monocultura da palma do óleo (*Elaeis guineensis*) pode favorecer pragas como as lagartas *Opsiphanes invirae* Hübner, *Brassolis sophorae* L. (Lepidoptera: Nymphalidae) e *Eupalamides cyparissias* (Fabricius) (Lepidoptera: Castniidae). O objetivo foi avaliar o potencial de *Trichospilus diatraeae* Cherian & Margabandhu (Hymenoptera: Eulophidae) como parasitóide de pupas de lepidópteras-praga da palma do óleo. Cinquenta fêmeas de *T. diatraeae* foram mantidas um tubo de ensaio por 48 horas com uma pupa dos seguintes hospedeiros: *O. invirae*, *B. sophorae* ou *E. cyparissias*, com, até, dois dias de

idade. *Trichospilus diatraeae* realizou o parasitismo nas três espécies de Lepidoptera, mas obteve potencial reprodutivo em pupas de *O. invirae* e *B. sophorae*. Isto sugere que este parasitoide, de hábito polífago, pode representar uma alternativa para o controle de pragas de lepidópteros da palma de óleo na Amazônia brasileira.

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