

Record of *Tetrastichus howardi* (Hymenoptera: Eulophidae) parasitizing *Diatraea* sp. (Lepidoptera: Crambidae) in sugarcane crop in Brazil

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Abstract

VARGAS EL, FAGUNDES PEREIRA F, TEIXEIRA TAVARES M, PASTORI PL. 2011. Record of *Tetrastichus howardi* (Hymenoptera: Eulophidae) parasitizing *Diatraea* sp. (Lepidoptera: Crambidae) in sugarcane crop in Brazil. ENTOMOTROPICA 26(3): 143-146.

Biological control has been considered a viable alternative for pest control and new research is being carried out constantly to find new natural enemies or improve the efficiency of known ones. We record *Tetrastichus howardi* (Olliff, 1893) (Hymenoptera: Eulophidae) parasitizing larvae and pupae of *Diatraea* sp. (Lepidoptera: Crambidae). *Diatraea* sp. pupae parasitized by *T. howardi* were collected in sugarcane fields in Dourados, Mato Grosso do Sul State, Brazil and has been maintained on *D. saccharalis* pupae in laboratory. Data on parasitism of *D. saccharalis* larvae in laboratory by *T. howardi* are presented. These results indicate that *T. howardi* parasitizes and develops in *Diatraea* sp. larvae and pupae and the potential as a biocontrol agent should be investigated.

Additional key words: biological control, host-parasitoid interactions, hyperparasitism, *Saccharum officinarum*, sugarcane borer.

Resumen

VARGAS EL, FAGUNDES PEREIRA F, TEIXEIRA TAVARES M, PASTORI PL. 2011. Registro de *Tetrastichus howardi* (Hymenoptera: Eulophidae) parasitando *Diatraea* sp. (Lepidoptera: Crambidae) en plantaciones de caña de azúcar en Brasil. ENTOMOTROPICA 26(3): 143-146.

El control biológico ha sido considerado como una alternativa viable para el control de plagas y nuevas investigaciones se están realizando constantemente para encontrar nuevos enemigos naturales o mejorar la eficiencia de los conocidos. Registramos *Tetrastichus howardi* (Olliff, 1893) (Hymenoptera: Eulophidae) parasitando larvas y pupas de *Diatraea* sp. (Lepidoptera: Crambidae). Las pupas parasitadas de *Diatraea* sp. por *T. howardi* fueron colectadas en campos de caña de azúcar en Dourados, Mato Grosso do Sul, Brasil y fueron mantenidas en el laboratorio en pupas de *D. saccharalis*. Se presentan datos de parasitismo de larvas de *D. saccharalis* en laboratorio por *T. howardi*. Los resultados indican que *T. howardi* parasita y se desarrolla en larvas y pupas de *Diatraea* sp. y por ende su rol como control biológico debe ser investigado.

Palabras clave adicionales: control biológico, interacciones hospedero-parásito, hiperparasitismo, *Saccharum officinarum*, taladrador de la caña de azúcar.

Diatraea sp. (Lepidoptera: Crambidae) is a widely distributed pest of sugarcane crop, which causes extended damage (Botelho et al. 1999,

Macedo and Araújo 2000). Currently, studies on biological control of this pest using egg, larval and pupal parasitoids are being carried

out by researchers of the Universidade Federal da Grande Dourados (UFGD), Dourados, Mato Grosso do Sul State, Brazil.

Tetrastichus howardi (Hymenoptera: Eulophidae) is an Asian species and is widely distributed from northern Australia to northern China and western Pakistan (LaSalle and Polaszek 2007). In South Africa, *T. howardi* was released for biological control of *Plutella xylostella* (Linnaeus, 1758) (Lepidoptera: Plutellidae) (LaSalle and Polaszek 2007), *Chilo partellus* (Swinhoe) (Lepidoptera: Pyralidae) and *Helicoverpa armigera* (Huebner, 1805) (Lepidoptera: Noctuidae) (Moore and Kfir 1995a). In Trinidad, this parasitoid was introduced as a potential biological control agent of *Diatraea* spp. (Bennett 1965), and releasing this parasitoid in sugarcane crops in Cuba (González et al. 2003a, 2003b) showed 20.0 % of parasitism (Felix et al. 2005). In Brazil, *T. howardi* was reported in *P. xylostella* pupae in Pernambuco State (Silva-Torres et al. 2010) and in *D. saccharalis* pupae on maize in Minas Gerais State (Cruz et al. 2011).

Tetrastichus howardi is a gregarious endoparasitoid and facultative hyperparasitoid (Prütz et al. 2004). It can develop either as a primary or secondary parasitoid (Sullivan and Völkl 1999) and was able to discriminate between parasitized and unparasitized hosts, initially preferring parasitized hosts, but two days later preferring unparasitized hosts (Moore and Kfir 1995b). *Tetrastichus* spp. are considered to be idiobionts. The larvae of *D. saccharalis* did not develop any further after parasitization and the parasitoids emerged from larvae. Under laboratory conditions, *T. howardi* develops in mantodean, lepidopteran, coleopteran, dipteran, and hymenopteran species (Bennett 1965, Moore and Kfir 1995a, 1995b, Kfir et al. 1993, Kfir 1997, Felix et al. 2005, Baitha et al. 2004, Prasad et al. 2007).

Material and methods

During the establishment of an experiment, one *Diatraea* sp. pupa was collected in sugarcane crop at the Fazenda Experimental of UFGD (22°13'16"S, 54°48'2"W, 530 m). The pupa was put in a glass tube (2.5 x 14.0 cm) and kept in an acclimatized chamber at 25 ± 2°C, 70 ± 10 % relative humidity and 14-hour photophase. A sample with parasitoids fixed in 85.0 % alcohol was sent to Departamento de Ciências Biológicas at Universidade Federal do Espírito Santo (UFES) for identification.

The colony of this parasitoid was kept in glass tubes (2.5 x 14.0 cm) closed with a cotton wad with honey droplets as food for them. For multiplication of the parasitoid, *D. saccharalis* pupae (24 to 48 hours old) were exposed to parasitism for 24 hours. After parasitization, each pupa was kept separately in a glass tube in a climatized chamber at 25 ± 2°C, 60 ± 10 % relative humidity and 14-hour photophase, until adult emergence.

To study the development of the parasitoids, fifteen 5th instar larvae of *D. saccharalis* were isolated in Petri dishes (9.0 x 1.5 cm). Each larva was exposed to parasitism with five parasitoids for 72 hours. Hereafter, the parasitoids were removed and the host larvae were kept in acclimatized chambers at 25 ± 2°C, 60 ± 10 % relative humidity and 14-hour photophase until parasitoid emergence.

Results

After 14 days, 36 parasitoids (91.6 % females) emerged. The parasitoid was identified as *Tetrastichus howardi* (Olliff, 1893) (Hymenoptera: Eulophidae), this being the first record of that species naturally parasitizing *Diatraea* sp. in sugarcane crop in Brazil. Voucher specimens of the parasitoid were deposited in the permanent collection of Departamento de Ciências Biológicas at UFES, Brazil.

It was observed that *D. saccharalis* larvae were parasitized by *T. howardi* in laboratory. Life cycle of *T. howardi* in *D. saccharalis* larvae was 23 days, and progeny summed 170 individuals (92.3 % females), from one individual host.

Discussion

Tetrastichus spp. are larval-pupal parasitoids, and the development of *T. howardi* in two stages of *D. saccharalis* (larval and pupal) is a very significant fact pointing to greater efficiency in biological control of this pest possibly due to a combined effect with other species of parasitoids, such as *Trichogramma galloi* Zucchi, 1988 (Hymenoptera: Trichogrammatidae) and *Cotesia flavipes* (Cameron, 1891) (Hymenoptera: Braconidae), which are used by sugarcane producers to control *D. saccharalis* (Botelho et al. 1999). Thus, the use of biological control methods is important for the management of pests, because parasitoids may have a considerable influence on the control of herbivorous arthropods in agricultural and forest crops (Prütz et al. 2004, Nofemela and Kfir 2005, Pereira et al. 2008, 2010). Hence, increasing biological control agents already present is priority, because it has minimum or no cost to growers (Monteiro et al. 2006).

Our results indicate the existence of a natural enemy (*T. howardi*) which parasitizes *Diatraea* sp. larvae and pupae. Its potential use should, however, be investigated for improvement in the method of mass rearing, the dispersion in the field and the association with parasitoids of eggs (*Trichogramma galloi*) and larvae (*Cotesia flavipes*) applied at the same time.

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