OCCURRENCE AND BIOLOGY OF *TETRASTICHUS HOWARDI* (OLLIFF) (HYMENOPTERA: EULOPHIDAE) IN *DIATRAEA SACCHARALIS* (FABR.) (LEPIDOPTERA: PYRALIDAE)

Maria de Lourdes Corrêa Figueiredo1

Ivan Cruz1; Rafael Braga da Silva2; Ana Carolina Maciel Redoan1; Angélica Maria Penteado - Dias

[1]Embrapa Milho e Sorgo, Laboratório de Criação de Insetos, Sete Lagoas, MG. ivancruz@cnpms.embrapa.br; figueiredomlc@yahoo.com.b
ac.redoan@gmail.com
[2]Programa de Pós - graduação em Ecologia e Recursos Naturais, Universidade Federal de São Carlos, SP. rafaelentomologia@yahoo.com.br; angelica@ufscar.br

INTRODUÇÃO

Diatraea saccharalis (Fabr.) (Lepidoptera: Pyralidae) is a key pest of sugarcane (*Saccharum officinarum* L.) and has also become a very important pest for corn and sorghum in Brazil (Cruz, 2007). Due to its main habit of feeding inside the plant stalk, conventional control measures through chemical foliar spraying have not achieved sufficient control levels. In sugarcane fields in Brazil the control of this pest is achieved through the release of natural enemies. Biological control programs for *D. saccharalis* in Brazilian regions, covering a total area of 2.3 million hectares, have been implemented with the parasitoids *Cotesia flavipes* Cameron (Hymenoptera: Braconidae), *Metagonistylum minense* Towns and *Paratheresia claripalpis* Wulp (Diptera: Tachinidae) (Botelho, 1992). Tetrastichinae is the largest subfamily of Eulophidae with hosts in more than 100 families of insects of different orders (La Salle 1994, La Salle and Schauff 1995). *Tetrastichus howardi* (Olliff) (Hymenoptera; Chalcidoidea: Eulophidae) is a gregarious pupal parasitoid which has been recorded as a primary parasitoid or facultative hyperparasitoid associated with a great number of Lepidoptera pest species of important crops (Baitha *et al.*, 2004, Prasad *et al.*, 2007, La Salle and Polaszek 2007).

OBJETIVOS

This study reports the occurrence of *T. howardi* from pupa of *D. saccharalis* collected in maize stalks in Brazil. It also includes preliminary data about the insect biology.

MATERIAL E MÉTODOS

Routine surveys in maize fields were conducted in Sete Lagoas, Minas Gerais State, Brazil. *Diatraea saccharalis* were collected at different phases of development, during November 2007, resulting in two pupae which were parasitized. Specimens of the parasitoid were identified by Dra. Angélica M. Penteado - Dias and Dr. John La Salle as *Tetrastichus howardi* (Olliff) (Hymenoptera; Chalcidoidea: Eulophidae). Since then, a culture of this species has been maintained on pupae of *D. saccharalis* and *Spodoptera frugiperda* (J.E. Smith) (Lepidoptera: Noctuidae). Twenty pupae of *D. saccharalis* obtained from larvae reared on artificial diet were placed in individual test tubes (10 *imes* 2.5 cm, closed with cotton) together with one female and one male of *T. howardi* for a 24 h period. Pupae were replaced daily for four consecutive days. After each 24 h period the parasitized pupae were removed to other similar tubes and kept in the same environment in which they were previously. After emergence, parasitoids were sexed and counted. The data were analyzed by one - way Analysis of Variance (ANOVA) through the computer

program SISVAR (Ferreira 2000) and treatment means were compared with the Scott - Knott test ($p = 0.05$) (Scott and Knott 1974).

RESULTADOS

The average number of parasitoids which emerged from each *D. saccharalis* pupa was 66.4 ± 22.7, 36.0 ± 11.0, 21.3 ± 12.3 and 47.7 ± 28.0, for days one to four of the experiment, respectively. The number of parasitoids obtained in the first day was higher than that obtained in the remaining days (p ¡ 0.05). There was no difference between the number of parasitoids obtained from infestation held in the second and fourth day (p ¿ 0.05). The sex ratio was strongly female biased at 0.81 ± 0.12. The life cycle of the parasitoid (considered the period from oviposition to adult emergence) was 25.5 ± 3.2 days. The longevity of male (4.3 ± 1.0 days) was lower than the longevity of female (10.0 ± 1.0 days) (p ¡ 0.05). According to Moore and Kfir (1995), 35% of female *T. howardi* lay eggs in the first 24 h after emergence. After 48 h that index was up to 80%. Moore and Kfir (1995) concluded that *T. howardi* has a pre - oviposition period varying of 2 h to five days. The parasitoid also did not show any preference for the age of the host pupa, when comparing pupae from one to five days old of the species *C. partellus* and *Helicoverpa armigera* (Hübner) (Lepidoptera: Noctuidae) (Moore and Kfir 1995b). Males of *T. howardi* emerge first and stay close to the host pupa waiting the emergence of the females to mate, as pointed out by González *et al.*, (2003). However, Moore and Kfir (1995) observed that 35.3% of emerged females which were separated from males at emergence still produced both female and male offspring, indicating mating inside the host pupa before the female emerged. Unfertilized female produce only male offspring. *Tetrastichus howardi* is a primary parasitoid or facultative hyperparasitoid associated with insect pests of the order Lepidoptera, especially various cereal stem borers. These include *D. saccharalis*, as well as important pests which do not currently occur in Brazil, such as *Eldana* sp. (Lepidoptera: Pyralidae) (La Salle and Polaszek 2007, Moore and Kfir 1995, Polaszek and LaSalle 1995).

CONCLUSÃO

The species *T. howardi*, found in association with the corn borer *D. saccharalis* in Brazil, can be an additional option for the integrated pest management in those crops where the insect is a key pest such as the sugarcane, corn and sorghum.

[Acknowledgements: To Brazilian Institute of Science and Technology - Hymenoptera Parasitoid of Southeast Region (HYMPAR/Sudeste CNPq/FAPESP/CAPES) and FAPEMIG, for the financial support. Thanks to Dr. John La Salle for helping in species identification.]

REFERÊNCIAS

Baitha, A.; Jalali, S. K.; Rabindra, R. J.; Venkatesan, T.; Rao, N. S. 2004. Parasitizing efficiency of the pupal parasitoid, *Tetrastichus howardi* (Olliff) (Hymenoptera: Eulophidae) on *Chilo partellus* (Swinhoe) at different exposure periods. Journal of Biological Control. 18: 65 - 68. Botelho, P. S. M. 1992. Fifteen years of biological control of *Diatraea saccharalis* using parasitoids. Pesquisa Agropecuária Brasileira. 27:255 - 262. Cruz, I. 2007. The Sugarcane Borer, *Diatraea saccharalis*, in corn in Brazil. 12p. Embrapa - CNPMS, Sete Lagoas. (Embrapa - CNPMS (Circular Técnica, 91). Ferreira, D. F. 2000. SISVAR system for statistical analysis: a handbook for guidance. 37p. UFLA, Lavras. González, J. F. A.; Oca, F. N. M.; Ravelo, H. G. 2003. Bio - ecological studies of *Tetrastichus howardi* Olliff. (Hymenoptera: Eulophidae), pupal parasite of *Diatraea saccharalis* (Fabr.) (Lepidoptera: Crambidae) in Cuba. Centro Agricola. 30: 37 - 41. La Salle, J. 1994. North American genera of Tetrastichinae (Hymenoptera: Eulophidae). Journal of Natural History. 28:109 - 236. La Salle, J.; Polaszek, A. 2007. Afrotropical species of the *Tetrastichus howardi* species group (Hymenoptera: Eulophidae). African Entomology. 15:45 - 56. La Salle, J.; Schauff, M. E. 1995. The Chalcidoid families. Eulophidae. In: Hanson, P.E.; Gauld, I.D. (eds.). The Hymenoptera of Costa Rica. Oxford University Press, New York, NY, USA. Moore, S.D.; Kfir, R. 1995. Aspects of the biology of the parasitoid, *Tetrastichus howardi* (Olliff) (Hymenoptera: Eulophidae). Journal of African Zoology. 109: 455 - 466. Prasad, K.S.; Aruna, A.S.; Kumar, V.; Kariappa, B.K. 2007. Feasibility of mass production of *Tetrastichus howardi* (Olliff), a parasitoid of leaf roller (*Diaphania pulverulentalis*), on *Musca domestica* (L.). Indian Journal of Sericiculture. 46: 89 - 91. Scott, A. J.; Knott, M. A. 1974. A cluster analysis method for groupingmeans in the analysis of variance. Biometrics. 30:507 - 512.