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Occurrence of *Microplitis croceipes* (Cresson) (Braconidae: Microgastrinae) as parasitoid of *Manduca sexta paphus* (Cramer) (Lepidoptera: Sphingidae) in Southern of Goiás, Brazil

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Abstract

Microplitis croceipes (Cresson) (Braconidae: Microgastrinae), which is an important larval has served as a model for a number of studies examining the learning and foraging behavior of insects. Like other wasps, *M. croceipes* uses olfactory and visual cues to locate and lay their eggs in, *Heliocoverpa zea* (Boddie), *Heliothis virescens* (Fabricius), and *Heliothis subflexa* (Quenée) (Lepidoptera: Noctuidae) as well as to locate food resources and it has been determined that the use of these mediating cues are improved through associative learning. *Manduca sexta paphus* (Cramer) (Lepidoptera: Sphingidae) is known in Brazil as the tobacco worm and is generally found on Solanacea plants, especially tobacco. This species is found in tobacco fields, vegetable gardens, and a wide variety of other habitats. The occurrence of the parasitoid *M. croceipes* parasitizing two larva *Manduca sexta paphus* on soybean (*Glicine max* L. Merr.) in southern of Goiás, Brazil is reported in this paper.

***Key Words*:** Enemy natural, Biocontrol, First occurrence, Insets pests, Agriculture.

1. Introduction

As a possibility to control of insect's pests certain groups of parasitoids, agents responsible for reducing insects (Marchiori *et al*., 2002) can be used.

Parasitoids are important regulators of insect populations and stand out as the main group of natural enemies in agricultural systems. Are dispersed in several families of insects and their adaptation to the parasitic mode of life is more diverse and abundant in Hymenoptera (Panizzi and Parra, 2009).

The Braconidae form the second largest family of the Hymenoptera, comprising about 40,000 species distributed worldwide in several different habitats. They are considered key-species for the maintenance of the balance in the communities that include them (Scatolini and Penteado-Dias, 1997).

Their majority is constituted of primary parasitoids of other insects and is normally associated to a single host. They may be endoparasitoids or ectoparasitoids, koinobionts or idiobionts (Scatolini and Penteado-Dias, 1997). The most common hosts of Braconidae parasitoids are larvae of Lepidoptera, Coleoptera and Diptera. The family is divided into 43 sub-families. The Microgastrinae constitute the largest sub-family of Braconidae, rich in species, many of them considered important parasitoids of several crop pest species of Lepidoptera.

Manduca sexta paphus (Cramer) (Lepidoptera: Sphingidae) (Figure 1) is known in Brazil as the tobacco worm and is generally found on Solanacea plants, especially tobacco. This pest is important for the tobacco crop since it may cause plant defoliation (Zucchi *et al.*, 1993). This species is found in tobacco fields, vegetable gardens, and a wide variety of other habitats.

The objective of this manuscript is to report the occurrence of *Microplitis croceipes* (Cresson) (Braconidae: Microgastrinae) parasitizing *Manduca sexta paphus* in Brazil.

Figure 1 - *Manduca sexta* larvae parasitized.
Source: Photograph by University of Florida.
/Nematology Department: Feature Creature.

Figure 2. Adult of *Microplitis croceipes.*
Source:
https://www.google.com.br/search?q=Microplitis+croceipes&source=lnms&tbm=isch&sa=X&ei=n47IUtyyNsqokQen5YDIDg&ved=0CAcQ_AUoAQ&biw=1366&bih=666.

2. Material and Methods

The experiment was carried out at the Santa Maria Farm in southern of Goiás, Brazil (18°25'S; 49°13'W). The farm has 100 hectares destined to soybean and maize cropping and to dairy cattle rearing. The survey of crop pests was carried out from February to March 2002 using an area of one hectare, divided into seven 44x20 m plots. During the survey, two larvae of *Manduca sexta paphus*, bearing pupae of parasitoids on its dorsal side, was manually collected. These larvae were taken to the laboratory of the Lutheran Institute of Superior Teaching of Itumbiara, placed into a glass flask covered with cheesecloth, and maintained under room temperature until emergence of the adult parasitoids. Aldaisa Martins Silva Oliveira, from the Department of Agronomy of the Lutheran Institute of Superior Teaching of Itumbiara, Goiás, identified the Lepidoptera. Dra. Angelica Penteado-Dias, from the Federal University of São Carlos, State of São Paulo, identified the parasitoid.

3. Results and Discussion

A total of 43 *M. croceipes* adults were obtained of two larvae of *Manduca sexta phalphus*. The Microgastrinae are solitary or gregarious koinobionts endoparasitoids of larvae of almost all families of Lepidoptera (Scatolini and Penteado-Dias, 1997; Parra *et al*., 2002).

Microplitis croceipes, which is an important larval has served as a model for a number of studies examining the learning and foraging behavior of insects (Takasu and Lewis, 1993). Like other wasps, *M. croceipes* uses olfactory and visual cues to locate and lay their eggs in, *Heliocoverpa zea* (Boddie), *Heliothis virescens* (Fabricius), and *Heliothis subflexa* (Quenée) (Lepidoptera: Noctuidae). as well as to locate food resources (Takasu and Lewis, 1996), and it has been determined that the use of these mediating cues are improved through associative learning (Takasu and Lewis, 1996).

Lewis and Tumlinson (1988) discovered that a parasitoid wasp, *M. croceipes*, could associatively learn chemical cues from its host and respond to these cues when searching for hosts in varied environments. Female wasps of *M. croceipes* are parasitoids of three highly polyphagous larval hosts, *H. zea* and *H. virescens.* Once a host is found, the wasp oviposits an egg directly into the caterpillar larvae. The wasp larva, after feeding on the caterpillar, emerges and weaves a cocoon. An adult wasp emerges in 7 to 10 days. *M. croceipes* and its use as a model for the development of a biological sensor.

Manduca sexta has many native parasites that control population numbers, including species parasites *Trichogramma* spp. (Hymenoptera: Trichogrammatidae), *Cotesia congregata* (Say) (Hymenoptera: Braconidae) and *Hyposoter exigua* (Viereck). (Hymenoptera: Ichneumonidae). Larvae that have been parasitized by *C. congregata* can be seen covered with white pupal cases of larval wasps that emerged from feeding and developing inside the caterpillar's body. *Trichogramma pretiosum* Riley (Hymenoptera: Trichogrammatidae) was released to control larvae at a rate of 378,000/acre at 3-day intervals and high levels of egg parasitism were attained (Metcalf and Metcalf., 1993).

Among the means for controlling flies, chemical insecticides are the most widely used. However, these may lose their efficiency as populations gradually become insecticide-resistant. The resistance to insecticides shows the growing need to introduce alternative insect control programs, for instance the biological control. It is possible to control these insects, by using the natural regulators such as parasitoids, which are the responsible agents for the reduction of the insects pests populations.

4. Conclusion

This is the first report on the occurrence of *M. croceipes* parasitizing *Manduca sexta paphus* and first occurrence of *Manduca sexta paphus* attacking soybean in Brazil.

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