

***Toxomerus duplicatus* Wiedemann, 1830 (Diptera: Syrphidae) preying on *Microtheca* spp. (Coleoptera: Chrysomelidae) larvae**

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Received: March 19, 2013 – Accepted: May 7, 2013 – Distributed: August 31, 2014

Abstract

Microtheca spp. (Coleoptera: Chrysomelidae) are insect pests primarily related to Brassicaceae crops. In the State of Rio Grande do Sul (RS), southern Brazil, they are found on forage turnip, *Raphanus sativus* L. var. *oleiferus* Metzg., which is commonly grown during fall/winter seasons. This work reports the predation of *Microtheca* spp. larvae by *Toxomerus duplicatus* Wiedemann, 1830 (Diptera: Syrphidae) larvae, on forage turnip crop, in Santa Maria, RS. This register provides new information about *Microtheca* spp. natural enemies in Brazil, which might be a new option for integrate pest management of these species.

Keywords: Brassicaceae, *Raphanus sativus* L. var. *oleiferus* Metzg., Predator.

***Toxomerus duplicatus* Wiedemann, 1830 (Diptera: Syrphidae) predando larvas de *Microtheca* spp. (Coleoptera: Chrysomelidae)**

Resumo

Microtheca spp. (Coleoptera: Chrysomelidae) são insetos-praga relacionados principalmente às culturas da família Brassicaceae. No Estado do Rio Grande do Sul (RS), no sul do Brasil, são encontrados no nabo forrageiro, *Raphanus sativus* L. var. *oleiferus* Metzg, comumente cultivado no outono/inverno. Este trabalho relata a predação de larvas de *Microtheca* spp. por larvas de *Toxomerus duplicatus* Wiedemann, 1830 (Diptera: Syrphidae), em nabo forrageiro, em Santa Maria, RS. Este registro oferece nova informação sobre os inimigos naturais de *Microtheca* spp. no Brasil os quais podem ser uma nova opção para o manejo integrado dessas espécies.

Palavras-chave: Brassicaceae, *Raphanus sativus* L. var. *oleiferus* Metzg., Predador.

1. Introduction

Microtheca spp. (Coleoptera: Chrysomelidae) are insect pests primarily related to Brassicaceae crops and its occurrence is reported from South America, where they are indigenous, to southeastern United States, especially *Microtheca ochroloma* Stal, 1860 and *Microtheca semilaevis* Stal, 1860 (Manrique et al., 2010). In Brazil these species are found in different Brassicaceae crops (Menezes Júnior et al., 2005; Farinha et al., 2009; Poncio et al., 2010) and their presence commonly results in severe defoliation, due to the feeding habits of both larvae and adults, which are based on consumption of leaf tissue. This makes *Microtheca* spp. species very important pests, especially to organic farmers who have few options to control infestations satisfactorily, including *M. ochroloma* (Poncio et al., 2010) and *M. semilaevis*. Consequently considerable losses in

production are verified, especially because the low value of the products on the market due to visual depreciation.

In the state of Rio Grande do Sul, southern Brazil, larvae of these insects are also found on forage turnips, *Raphanus sativus* L. var. *oleiferus* Metzg., which is commonly grown on areas after grain production, such as maize and soybean, during fall/winter seasons, where it is an option for rotation crops schemes, due to its capacity of covering the soil and cycling chemical elements, mainly phosphor and nitrogen (Ohland et al., 2005). Besides the dry matter losses, the presence of these beetles on forage turnip crop areas raises the concern of possible establishment as alternative sites for both feeding and reproduction by *Microtheca* spp. since spraying is not usually employed by farmers on this crop.

The maintenance of natural enemies in crop areas is one of the basic aspects to integrate pest management and, thus, searching for natural enemies of *Microtheca* spp. in forage turnip crops is basic to determine what options for controlling these insect pests are present. In Brazil, Poncio et al. (2010) reported a Pentatomidae, predator of both larvae and adults of *M. ochroloma*, found on a Chinese cabbage (*Brassica chinensis* L.) crop area and no other natural enemies are reported in the country so far.

This work reports the predation of *Microtheca* spp. larvae by *Toxomerus duplicatus* Wiedemann, 1830 (Diptera: Syrphidae) larvae, on forage turnip crop.

2. Material and Methods

An experiment was carried out at experimental area of "Departamento de Fitotecnia" - Universidade Federal de Santa Maria (UFSM), latitude 29° 42' S, longitude 53° 49' W and 95 m height above the sea level. Forage turnip seedling was made on June 10th, 2010 with final plant density of 150 plants.m⁻² and a used area of 0.25 ha. Fertilisation was made according to soil chemical analysis and no chemical products were sprayed.

Fourteen samples were made from emergency to flowering (from June 24th, 2010 to 09th September, 2010, respectively). During each sample, fifty plants, chosen randomly, were evaluated totalling 700 evaluated plants. All leaves and stems were examined for presence of *Microtheca* spp. larvae and predators. The insects were collected and maintained in plastic cups of 100 mL with a small piece of leaf, and transported to the "Laboratório de Entomologia, Departamento de Defesa Fitossanitária" - UFSM. Syrphidae were individually kept in plastic cups lined with filter paper, humidified with distillate water. All Syrphidae preyed on *Microtheca* spp. larvae, offered on a daily basis. To ensure great Syrphidae survivorship and save *Microtheca* spp. individuals for providing adults (necessary to proper identification) aphids were offered together until the Syrphidae reach pupal stage. Maintained *Microtheca* spp. larvae were fed with forage turnip leaves until reach the pupal stage. Afterwards both Syrphidae and *Microtheca* spp. adults were sent to specialists for proper identification.

3. Results and Discussion

All beetle larvae were *M. ochroloma* or *M. semilaevis*. Eight Syrphidae larvae were collected on August 19th (2 larvae); August 23rd (1 larva); September 04th (3 larvae) and September 2nd (2 larvae) dates. Syrphidae voucher are deposited at Departamento de Defesa Fitossanitária, Universidade Federal de Santa Maria. Despite all insects having reached pupal stage, three adults were obtained; one was identified as *Toxomerus duplicatus* Wiedemann, 1830 and the other two were of the genus *Toxomerus* Wiedemann. Those were not possible to identify to species level due to changes in colour patterns which are intrinsic and used for proper identification. It was caused by long time storage in alcohol.

There are over 150 species of *Toxomerus* of which nearly 143 are distributed in the Neotropical Region (Marinoni et al., 2007). *T. duplicatus* is recorded for southern Brazil in the states of Paraná and Santa Catarina (Marinoni et al., 2007).

Where known, *Toxomerus* larvae are predators, and preys commonly are among groups Fulgoroidea, Cercopoidea, Cicadelloidea, Aleyrodoidea, Aphidoidea, Coccoidea (Hemiptera) and Thysanoptera (Thompson, 1982). Prey preferences of *T. duplicatus* are not known.

The predation of *Microtheca* spp. larvae by *T. duplicatus* in Brazil is new and represents an important option for the forage turnip and also for other Brassicaceae crops, especially where *M. ochroloma* and *M. semilaevis* larvae occur. Syrphidae larvae are known as important natural enemies of aphids in different crops (Oliveira et al., 2003; Ghahari et al., 2008), including greenhouses (Pimentel, 2007), due to their capacity of consuming great amounts of insects during its developmental time (Marinoni et al., 2007). Furthermore, adults perform an important role as pollinators of different vegetable species (Morales and Köhler, 2008). Thus, further studies such as those related to *T. duplicatus* biology and also multiplication techniques are necessary to investigate the possibility of using this predator as a biological control agent for both *M. ochroloma* and *M. semilaevis* larvae in different Brassicaceae crops.

The presence of Syrphidae larvae was observed in the final crop cycle period, near flowering, where availability of food resources to adults, such as pollen and nectar, were greater. This suggests that, during the whole period of *Microtheca* spp. occurrence, the use of border areas might increase *T. duplicatus* population, providing benefits to adult insects such as supplementary food resources, moderate microclimate and shelter (Venzon et al., 2005).

This register provides additional knowledge about the natural enemies of *Microtheca* spp. in Brazil, which might be a new option to integrate into pest management of *M. ochroloma* and/or *M. semilaevis* in Brassicaceae crops.

Acknowledgements

The authors thank Dr. Luciano de Azevedo Moura, from the Departamento de Zoologia, Universidade Federal do Rio Grande do Sul, for *M. semilaevis* and *M. ochroloma* identification and Mirian Nunes Morales for Syrphidae identification. Also, to the Conselho Nacional de Desenvolvimento Científico e Tecnológico and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior for fellowships.

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