Parasitoids of Sarcophagula occidua Fabricius (Diptera: Sarcophagidae) collecteds in cattle dung in Brazil

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Abstract

Species of parasitoids of dung-breeding Sarcophagula occidua Fabricius (Diptera: Sarcophagidae) were collected at a range pasture (July to December of 1998) and stable (July to December of 1999) in Itumbiara, Goiás, Brazil. Ten samples of bovine dung were taken at random, each month, from pats approximately one week old, placed in plastic containers and taken to the laboratory. Arthropods were extracted by flotation in water. Pupae were individually placed in gelatin capsules until emergence of adult flies or their parasitoids. Paraganaspis egeria Diaz & Gallardo (Hymenoptera: Figitidae: Eucoilinae) was the predominant specie that parasitized pupae of S. occidua.

KEY WORDS: Hymenoptera, Coleoptera, dipterous, flies, parasitoids.

Source: Pesquisa Agropecuária Tropical, jan./jun. 2000.

Introduction

Cattle feces accumulated in pastures and stables constitute a microhabitat especially favorable for the development of a rich and heterogeneous arthropod fauna. This habitat provides conditions for the breeding of various insect groups (Poorbaugh et al. 1968).

Among these insects are flies that are of medical and veterinary importance, since they can act to carry pathogens to humans and animals (Chow 1940). The association is due to the fact that flies are exploiters of organic substances and waste, which are produced by human and animal activity, especially feces and plant waste (Monteiro 1995).

Along with the flies, a varied fauna of parasitoids develops, responsible for the natural
control of these dipterans. Among the main enemies of the flies are the parasitoids of the families Staphylinidae, Pteromalidae, Figitidae, and Diapriidae (Figg et al. 1983, Blume 1984, Cervenka & Moon 1991, Silva 1991).

In this sense, the objective of this study was to collect in natural feces exposed in the pastures and in corrals the natural enemies of *Sarcophaga occidua* Fabricius (Diptera: Sarcophagidae) in Itumbiara, Goiás, Brazil.

**Material and Methods**

The experiment was carried out in Itumbiara, Goiás State, Brazil (18º25'S e 49º 13'W). Every fortnight, 10 plates of fecal cake (of approximately 3 kg each) were produced from fresh bovine feces that were collected immediately after defecation in pastures of *Brachiaria brizantha* (Hochst ex. A. Rich) and in corrals. The material was collected in plastic buckets and was homogenized. It was then placed in 10 round plastic supports of 20 cm in diameter, with a hole to allow rainwater to drain away. This methodology was used for precise determination of the time between the emission of the fecal cake and its collection. The feces remained exposed (five in the pastures and five in the corrals) for 15 days. After this period, the feces were taken to the laboratory for extraction of pupae by means of the flotation method. The pupae were removed with the aid of a sieve; they were counted and individually stored in gelatin capsules (number 00) until the flies and/or parasitoids emerged. The parasitoids and flies that emerged were identified with the aid of a stereoscopic microscope and were conserved in 70% alcohol.

The percentage parasitism of each parasitoid species was calculated by means of the number of pupae parasitized by each parasitoid species divided by the total number of pupae of that host, and multiplied by 100. The parasitoids’ preference for their hosts was tested by means of the chi-square test, with 5.0% probability.

**Results and Discussion**

Tables 1 and 2 show the parasitoids of *S. occidua*, obtained from feces collected from pastures and corrals. It is observed that in the pastures a greater diversity of parasitoid species was obtained. The total percentage of parasitism in *S. occidua* in pastures was 4.34%, while in corrals 1.37%.

In pastures and corrals, Pteromalidae and Eucoilinae were the most important parasitoids collected in cattle feces. Eucoilidae are the best representatives in the Neotropical region (Diaz & Gallardo 1996). The specimens of *A. notula* and *Neralsia*
*splendens* (Borgmeier) (Hymenoptera: Figitidae) were only collected in pupae of *S. occidua*.

Eucoilinae behave as primary parasitoids of immature stages of muscid diptera associated with bovine feces (Diaz & Gallardo 1996). *Paraganaspis egeria* Diaz, Gallardo & Walsh (Hymenoptera: Figitidae: Eucoilinae) was also collected from pupae of *S. occidua* in Argentina (Diaz & Gallardo 1996, Diaz et al. 1996).

Another species of Eucoilinae collected from *S. occidua* puparium in Itumbiara (GO), in pastures was *Coneucoela brasiliensis* Kieffer (Marchiori 1997).

The genus *Spalangia* as the most important group of parasitoids in cattle feces. *Spalangia* species are parasitoids of synanthropic flies in various parts of the world, and their use in biological control is possible.

Many species are known to develop in hosts living in feces, decomposing meat and plant tissues. In general, their hosts belong to the families Muscidae, Calliphoridae, Drosophilidae and Chloropidae (Boucek 1963). *Spalangia* species are predominantly associated with cattle manure and are parasitoids of muscid puparia (Rueda & Axtell 1985).

In a study by Marchiori (1997) with cattle feces in Uberlândia (MG) and Itumbiara (GO), the author found that *S. occidua* was the species with the highest parasitoid diversity. Almeida (1996) collected cattle pens from Pirassununga-SP, *A. notula* and Eucoilinae on pupae of *Sarcophagula* sp.

Marchiori & Linhares (1999) and Marchiori (1997) found that in Itumbiara (GO) and Uberlândia (MG), *A. notula* and *N. splendens* were also collected only in *S. occidua*.

Sereno & Neves (1993), obtained in a cattle farm in Igarapé (MG) a percentage of 4.5% parasitism in accumulated feces near the corrals. In Uberlândia (MG), Marchiori & Linhares (1999) obtained 27.3% parasitism in pupae of *Sarcophagula* spp.

In the pastures, *A. notula*, *P. egeria* and *Trichopria* sp. showed preference for pupae of *S. occidua* ($X^2 = 86.85; GL = 24; P = 36.42$), while corral nodes, *M. raptor*, *N. splendens*, *P. egeria* and *S. nigroaenea* showed preference for pupae of *S. occidua* ($X^2 = 225.56, GL = 18, P = 28.87$).
As shown in Tables 1 and 2, in both studied environments the parasitoid *P. egeria* was the species that presented the highest percentage of parasitism in pupae of *S. occidua*, 1.55% in feces collected from pastures and 0.58% in corrals.

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| Table 1. Relation of parasitoid occurrence and percentage of parasitism of Sarcophaga occidenta Fabricius (Diptera: Sarcophagidae) in pasture area in the municipality of Itumbiara, Goias, Brazil. |
|---|---|---|---|
| Hosts and number of pupae | Parasitoids | Frequency | Percentage of parasitism |
| Sarcophaga occidenta (2006) | Aleochara notula | 03 | 0.15 |
| | Muscidifurca zaraptor | 01 | 0.05 |
| | Neralisia splendens | 01 | 0.05 |
| | Paracanapis aegeria | 31 | 1.55 |
| | Spalangia cameroni | 08 | 0.40 |
| | Spalangia drosophilae | 17 | 0.85 |
| | Spalangia endius | 04 | 0.20 |
| | Spalangia nigroaenea | 10 | 0.50 |
| | Trichopria sp. | 08 | 0.40 |
| | Triplasta atrocoxalis | 04 | 0.20 |
| TOTAL | | | 87 |
Table 2. Relation of parasitoid occurrence and percentage of parasitism of *Sarcophaga occidia* Fabricius (Diptera: Muscidae) in corals in the municipality of Itumbiara, Goiás, Brazil.

| Hosts and number of pupae | Parasitoids         | Frequency | Percentage of parasitism |
|---------------------------|----------------------|-----------|--------------------------|
| *Sarcophaga occidia*      | *Muscisfurus raptor* | 04        | 0.1                      |
| (4521)                    | *Nervalsia splendens* | 14        | 0.3                      |
|                           | *Pachyneposides vindeminae* | 11   | 0.2                      |
|                           | *Paragaonapis egoria*  | 26        | 0.6                      |
|                           | *Spalangia cameroni*   | 04        | 0.1                      |
|                           | *Spalangia nigroanea*  | 03        | 0.1                      |
| **TOTAL**                 |                      | **62**    |                          |

Table 1. Relation of parasitoid occurrence and percentage of parasitism of *Sarcophaga occidia* Fabricius (Diptera: Sarcophagidae) in pasture area in the municipality of Itumbiara, Goiás, Brazil.

| Hosts and number of pupae | Parasitoids         | Frequency | Percentage of parasitism |
|---------------------------|----------------------|-----------|--------------------------|
| *Sarcophaga occidia*      | *Aleochara notula*   | 03        | 0.15                     |
| (2006)                    | *Muscisfurus zoraptor* | 01      | 0.05                     |
|                           | *Nervalsia splendens* | 01        | 0.05                     |
|                           | *Paragaonapis egoria* | 31       | 1.55                     |
|                           | *Spalangia cameroni*  | 08        | 0.40                     |
|                           | *Spalangia drosophilae* | 17     | 0.85                     |
|                           | *Spalangia endus*     | 04        | 0.20                     |
|                           | *Spalangia nigroanea* | 10        | 0.50                     |
|                           | *Trichopria sp.*      | 08        | 0.40                     |
|                           | *Triplasta atrocoxalis* | 04   | 0.20                     |
| **TOTAL**                 |                      | **87**    |                          |
