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Research Article

Parasitoids of fly collected in urban area in Brazil

Abstract

Objective this study aimed to ascertain the species of parasitoids of *Musca domestica* L. (Diptera: Muscidae) and their biological characteristics that were collected in one area of City of Goiânia, State of Goiás in Brazil. Parasitoids were collected by exposing larvae of *M. domestica* and its breeding substrate (beef liver) outdoors, in containers filled with sand that were placed next to garbage containers. The study was from March to September 2015. Thirty-five (35) specimens of parasitoids were collected *Pachycrepoideus vindemmiae* (Rondani) (Hymenoptera: Pteromalidae) was the most frequent species, with 74.2%. This manuscript reports the first occurrence of *Hemencyrtus* sp. and *Tachinobia* sp. as solitary parasitoids in Goiás.

Introduction

Parasitoids are important regulators of insect populations and stand out as the main group of natural enemies in agricultural systems. They are present in various orders of insects and their adaptation to a parasitic behavior is seen most diversely and abundantly in the order Hymenoptera [1].

Another application of parasitoids may be related (besides biological control) to the study of Forensic Entomology which is the use of ecological data and development of necrophagous insect to estimate the postmortem interval in criminal investigations.

The objective of this study was to verify the parasitoid species of *Musca domestica* L. (Diptera: Muscidae) and their biological characteristics collected in an urban area in Brazil.

Materials and Methods

This experiment was conducted in the urban area near Botafogo River, Goiânia, Goiás, Brazil. Parasitoids were collected by exposing larvae of *M. domestica* and its breeding substrate (bovine beef liver) outdoors, in containers filled with sand that were placed next to garbage containers [2]. The parasitoids were collected by using four traps [3]. The following items were used as baits: human feces, cattle kidneys, cattle liver and fish which were placed inside the cans, over a layer of earth. To obtain the parasitoids, the contents of the traps were placed in plastic containers with a layer of sand for use as a substrate for transformation of the larvae into pupae [3].

Results and Discussion

From March to September 2015, 35 specimens of parasitoids were collected (Table 1). The number of specimens collected in urban areas was possibly due to greater food supply, to variations in the quality and availability of food resources.

The percentage parasitism of each parasitoid species was calculated by means of the number of pupae parasitized per species of parasitoid, divided by the total number of pupae from that host and multiplied by 100.

Pachycrepoideus vindemmiae (Rondani) (Hymenoptera:

Table 1: Percentage of parasitism, number of pupae parasitized and number of individuals of parasitoids of *Musca domestica* L. 1758 (Diptera: Muscidae) collected in area urban in Brazil.

Taxonomic Group	Number of pupae parasitized	Percentage of parasitism	Number of individuals
Encyrtidae:			
Hemencyrtus sp.	1	2.9	1
Eulophidae:			
Tachinobia sp.	1	2.9	1
Pteromalidae:			
Pachycrepoideus vindemmiae	26	74.2	26
Spalangia spp.	7	20.0	7
Total	35	-	35

The percentage parasitism of each parasitoid species was calculated by means of the number of pupae parasitized per species of parasitoid, divided by the total number of pupae from that host and multiplied by 100.

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Pteromalidae) (Figure 1), was the most frequent species, with 74.2%. Since several species of parasitoids were collected in the same host, it is very likely that interspecific competition determined which species of parasitoid would emerge in greater quantity, as well as the remainder would have been eliminated by competition.

These proportions are related to the search capacity and the seasonal variation in parasitoid levels. *Pachycrepoideus vindemmiae* had the highest percentage of parasitism. Perhaps its greater competitive potential in the larval stage can explain this fact.

Pachycrepoideus vindemmiae is a parasitoid that controls a great number of Diptera in the families Anthomyiidae, Calliphoridae, Muscidae, Sarcophagidae, Tachinidae and Tephritidae. This species presents diversified (cosmopolitan) distribution and it has been found in North America and Africa [5].

Table 2 shows the biological characteristics of the parasitoids

Figure 1: *Pachycrepoideus vindemmiae* (Rondani) (Hymenoptera: Pteromalidae).

Table 2: Biological characteristics of parasitoids of *Musca domestica* L. 1758 (Diptera: Muscidae) collected in area urban in Brazil.

Taxonomic Group	Stage of parasitism	Type of parasitism	Number of individual/Pupae	Types of parasitoids
Encyrtidae:				
Hemencyrtus Herberti	Larval	Endoparasitoid	Solitary	Koinobiont
Tachinaephagus zealandicus	Larval	Endoparasitoid	Gregarious	Koinobiont
Eulophidae:				
Tachinobia sp.	Larval	Endoparasitoid	Solitary or Gregarious	Koinobiont
Pteromalidae:				
Pachycrepoideus vindemmiae	Pupal	Ectoparasitoid	Solitary	*Idiobiont*
Spalangia spp.	Pupal	Ectoparasitoid	Solitary	*Idiobiont*

of fly collected in Brazil. Majority were of parasitoids, larvae, solitary, endoparasitoids and Koinobionts. Most behave as and solitary forming small pupae, probably resulting from competition for food.

These insects are considered bioindicators for the biodiversity of ecosystems, and are considered as key species for maintaining the equilibrium of the communities in which they are included. In addition, since they are natural enemies of insects, they may be used in biological control programs of agricultural pests [4].

Definitions- Parasitoid larval oviposita inside the larva, but the adult or adults emerge from the puparium. **Parasitoid pupal** oviposita in the pupa and the adult or adults emerge from the puparium. **Endoparasitoid:** in them the larvae of the parasitoids develop inside the body of the host. **Ectoparasitoid:** larvae of parasitoids develop on the host. **Solitary:** is that a parasitoid out of each parasitized pupae. **Gregarious** species in a single host may occur the development of several individuals. **koinobiont:** allow the host to continue its development while feeding on it. **Idiobiont:** which inhibit any host activity and development at the time of parasitization.

This manuscript reports the first occurrence of *Hemencyrtus* sp. and *Tachinobia* sp. as solitary parasitoids in Goiás.

Conclusion

Thirty-five (35) specimens of parasitoids were collected. *P. vindemmiae* was the most frequent species, with 74.2%. In process of urbanization on parasitoids, they revealed that urbanization negatively affected or had no effect on parasitoids. Majority were of parasitoids, larvae, solitary, endoparasitoids and Koinobionts. This manuscript reports the first occurrence of *Hemencyrtus* sp. and *Tachinobia* sp. as solitary parasitoids in Goiás.

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