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Parasitoids (Hymenoptera) collected using different trap types in Brazil

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Abstract

Among the order Hymenoptera, parasitoids are the group with the greatest species richness, so much so that emphasized that their diversity is so great that the need for basic collections has preceded ecological observations. The objective of this study was to report the species of parasitoid immature stages of Diptera obtained using pitfall traps and metal container traps in Brasil. The dipterous pupae were obtained by the flotation method. They were individually placed in gelatin capsules until the emergence of the parasitoid. Parasitoids collected in the trap ptifall 220 and 183 in metal container. The trap pitfall Gnathopleura quadridentata Wharton (Hymenoptera: Braconidae) was more frequent specie with 71.3% in the metal container Pachycrepoideus vindemmiae (Rondani) (Hymenoptera: Pteromalidae) was more frequent with 55.6%. The attraction of the traps in relation to specimens of parasitoids and the species of parasitoids were not statistically significant.

Key words: natural enemy, biological control, State of Goiás

1-Introduction

Among the order Hymenoptera, parasitoids are the group with the greatest species richness, so much so that Eggleton (1990) emphasized that their diversity is so great that the need for basic collections has preceded ecological observations. Insects are considered to be parasitoids if the carnivorous larvae develop by feeding on other arthropods, the so-called hosts (Clausen, 1940). Such occurrences are only found among holometabolous insects, thus suggesting that this is a more recent living habit (Gauld and Bolton, 1988).

Parasitoids act as natural regulators of a variety of groups of herbivore insects, and also serve as indicators of the presence or absence of these populations. Without the action

of parasitoids, the herbivore population would explode, which would lead to destruction of the plant species that they consume. This makes them essential for maintaining the ecological balance and makes them an important element for the diversity of other organisms (Waage and Greathead, 1986; LaSalle and Gauld, 1993; Grissell, 1999). From an economic point of view, the group includes many species used in pest management programs in tropic and subtropical agro-ecosystems.

The objective of this study was to report the species of parasitoid immature stages of Diptera obtained using pitfall traps and metal container traps in Brasil.

2-Material and Methods

The study using the metal container was conducted between March 2001 and March 2002 in Itumbiara, Goiás Brazil. The flies were collected by using traps, made of dark cans measuring 19 cm in height and 9 cm in diameter, with two openings resembling blinders, located in the lowest third of the can, to allow flies to enter. The top of the can was connected to a nylon funnel that was open at both ends, with the base pointing down. This was wrapped in plastic bags, so that when they were removed, the flies and parasitoids could be collected. The following items were used as bait: human feces, cattle kidneys, cattle liver, pig carcass, fish and fruit, which were placed inside the cans, over a layer of earth. Six traps were used and they were hung on trees at a height of one meter above the ground, two meters apart from each other. The insects collected were taken to the laboratory, sacrificed with ethyl ether and kept in 70% alcohol for further identification.

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. This sand was sifted after being in the fields for 15 days and the pupae were extracted from it and were individually placed in gelatin capsules in order to obtain the flies and/or parasitoids.

The study on pitfall traps was also conducted in Itumbiara, Goiás, Brazil, between January and November 2005. Each trap consisted of a plastic receptacle (basin) of 15 cm in diameter by 10 cm in height. Each receptacle was buried in earth, such that its upper extremity was at the ground surface level. One liter of water, 20 ml of detergent and 2 ml of formol were placed in each receptacle. A 200 ml pot was attached to the basin by means of a thin wire that went across it close to its edge, so as to keep the pot hanging and centralized in the basin. The bait, consisting of human feces, was placed in this pot.

This trap was protected by another plastic receptacle of the same measurements (15 x 10 cm), which functioned as a cover. This contained four diametrically opposite holes of around 5 cm in diameter and 7 cm in height, and was supported on a metal wire suspended 10 cm from the group. Six traps were used, with separations of two meters between each other, placed randomly. The bait was replaced every 15 days. The pupae that were found in the bait were separated out by means of the floatation method. These were then individually packed in gelatin capsules until the parasitoids emerged.

The attraction that traps exerted on specimens and parasitoid species was tested by the 5% probability Analysis of Variance.

3-Results and Discussion.

The metal container traps were collected 180 parasitoids already in ptifall traps were collected in 220 parasitoids (Tab. 1). Despite the difference in the number of parasitoids collected in two traps, the attraction of the traps in relation to species of parasitoids ($F = 0.4$, $p = 0.85$), and the species of parasitoids ($F = 0.93$, $p = 0.54$) were not statistically significant.

According to Silva and Carvalho (2000) pitfall traps are a passive collection method, which depends on the insect activity, providing a rough estimate of the total number of species in a community, and is a simple and inexpensive method for ecological studies . These traps can be used to capture different groups of animals, from invertebrates to mammals small (Freire et al., 2011). These traps can be used to catch different groups of animals, from invertebrates to small mammals (Freire et al., 2011).

Traps constructed using metal receptacles have the advantage of being inexpensive and easy to construct. However, since these are constructed by the user, lack of standardization may occur and this can be considered to be a disadvantage (Souza et al., 2009). Among other disadvantages, the plastic collecting bag may collapse at times of rain or wind, and agglomeration may occur in association with the increased moisture levels produced through evaporation and transpiration of the bait, thereby damaging some specimens and making it difficult to identify them (Guimarães and Guimarães, 2003). These traps are used for studying parasitic Diptera and Hymenoptera (Marchiori, et al. 2007)

In the pitfall traps, the most frequently observed parasitoid was *Gnathopleura quadridentata* (Wharton) (Hymenoptera: Braconidae), accounting for 71.3%. This was

probably due to its seeking capacity, or seasonal factors presented by this species, or its greater potential for competition during the larval phase. These factors may explain the greater frequency of this species, although no factor for explaining the difference in frequencies among the parasitoids in this study was tested.

Gnathopleura quadridentata behaved as a solitary parasitoid and emerged from a pupa in the host. Species of the genus Gnathopleura have been used for biologically controlling Sarcophagidae and Muscidae (Wharton, 1979).

Regarding metal container traps the most frequent species was *Pachycrepoideus vindemmiae* (Rondani) (Hymenoptera: Pteromalidae) with 55.6%, probably due to its polígafo habit.

In relation to the metal container traps, the most frequent species was *Pachycrepoideus vindemmiae* (Hymenoptera: Pteromalidae), with 55.6%. This was probably due to its polyphagous habits. P. vindemmiae is considered to be a solitary parasitoid of many Diptera of the families Anthomyiidae, Calliphoridae, Muscidae, Sarcophagidae, Tachinidae, Tephritidae and others. It presents widespread geographical distribution, including in North America and Africa (Hanson and Gauld, 1995).

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Table 1- Parasitoids of dipterous collected in two different traps in southern Goiás, Brazil.

Taxonomic Groups	Metal Container Traps	Ptifall Traps
Braconidae:		
Gnathopleura quadridentata	22	157
Chalcididae:		
Brachymeria podagrica	21	0
Encyrtidae:		
Hemencyrtus herbertii	23	0
Figitidae:		
Neralsia sp.	0	43
Paraganapis egeria	1	0
Tribliographa sp.	0	17
Pteromalidae:		
Nasonia vitripennis	13	0
Pachycrepoideus vindemmiae	100	0
Spalangia endius	0	2
Spalangia nigroaenea	0	1
Total	180	220