

Parasitoid Hymenoptera collected during the diurnal and nocturnal periods in Itumbiara, Goiás

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The insects of the order Hymenoptera form a diverse group of approximately 200,000 species (La Salle and Gauld, 1992). Thanks to these insects, great savings in pest control programs have been achieved. They are mostly parasitoid organisms and, in the Neotropical region, they have been little studied and are poorly known. Parasitoid Hymenoptera are the most important biological control agents and they are responsible for most of the economic and environmental benefits produced by biological control programs. They may provide support for biological and conservation studies. Their action on hosts increases with growth in their population and decreases with reductions in populations. The two interlinked populations fluctuate in relation to each other in such a way as to impede both abrupt increases and the extinction of the host population (Gauld and Bolton, 1988; La Salle and Gauld, 1992; Scatolini and Penteado-Dias, 1997).

Interest in biological controls has grown in various countries, as a response to the adverse effects of chemical pesticides on the environment and on biodiversity. Moreover, it has grown as a function of new international trends in agricultural production involving the utilization of alternative means that are less aggressive to the environment and which favor conservation and the sustainable use of biodiversity (Scatolini and Penteado-Dias, 1997).

The objective of this study was to investigate the frequency of occurrence of parasitoid Hymenoptera collected during the diurnal and nocturnal periods in Itumbiara, State of Goiás.

The experiment was carried out in an area of remnant forest located close to the urban perimeter of Itumbiara, Goiás, at the coordinates 18° 25' S and 49° 13' W, in an area of the southern part of the State that has great economic importance because of its agricultural and industrial activities. The climate of the region is of AW type, according to Köppen's classification (Rosa and Assunção, 1991) with dry winters and rainy summers. It is a type of savanna climate, in which the annual rainfall is more than ten times the rainfall in the driest month (which is less than 60 mm).

The insects were collected in a Malaise trap. The collecting flasks were put out at 6:00 P.M. and replaced

by new ones at 7:00 A.M. every day for ten consecutive days, thus totaling 40 collections between May and August, 2005.

The parasitoids' preference for the diurnal or nocturnal period was analyzed by means of ANOVA, with a transformation of data to $\sqrt{x + 0.5}$ at the 5% probability level.

A total of 135 specimens of parasitoids was collected. These were distributed among seven superfamilies and sixteen families of Hymenoptera (Table 1). Chalcidoidea presented the greatest diversity of families, and this group together with Ichneumonoidea predominated in the native forest ecosystem.

Among the individuals collected, 39.3% were in the diurnal period and 60.7% in the nocturnal period (Table 1). The specimens and the parasitoid families did not present any preference for either of these two periods ($F = 0.73$; $P > 0.39$) and ($F = 1.26$; $P > 0.24$), respectively. Factors such as resource quality and availability, host density, climatic factors, floristic composition of the sampled fragment and the number of collections carried out may have influenced these results. According to Wallner (1987), not only climatic factors but also variations in resource quality and availability may cause changes in the population's abundance levels of these insects.

During the diurnal period, the family that was collected most was Ichneumonidae, accounting for 56.5% of the individuals collected (Table 1) with statistically significant predominance of this family in relation to the others ($F = 9.23$; $P > 0.0001$). This was probably due to its parasitizing efficiency: its species are parasitoids on eggs, larvae, pupae or imagoes of other insects (Scatolini and Penteado-Dias, 1997; Ros-Ferré et al., 1997).

During the nocturnal period, the family that was collected most was Encyrtidae, accounting for 31.7% of the individuals collected (Table 1). Many genera of Encyrtidae present polyembryonic reproduction, with many parasitoids emerging from a single host. Several species of this family have been successfully utilized in biological control programs (Noyes, 1980; Gauld and Bolton, 1988).

These results contribute towards the knowledge of the entomofauna of parasitic Hymenoptera in the Itumbiara region in the southern part of the State of Goiás.

Table 1. Relation of superfamilies and families of parasitoid Hymenoptera and frequency of specimens collected during the diurnal and nocturnal periods using a Malaise trap in Itumbiara, State of Goiás.

Superfamilies/Families	Number of specimens collected in diurnal period	Percentage	Number of specimens collected in nocturnal period	Percentage	Total
CHRYSIDOIDEA					
Bethylidae	0	0	4	4.9	4
Dryinidae	2	3.8	1	1.2	3
CHALCIDOIDEA					
Chalcididae	0	0	2	2.4	2
Encyrtidae	3	5.7	26	31.7	29
Eulophidae	0	0	1	1.2	1
Eupelmidae	1	1.9	3	3.7	4
Mymaridae	2	3.8	5	6.1	7
Pteromalidae	0	0	1	1.2	1
Torymidae	0	0	1	1.2	1
CYNIPOIDEA					
Figitidae	0	0	1	1.2	1
EVANIOIDEA					
Evaniidae	2	3.8	1	1.2	3
ICHNEUMONOIDEA					
Braconidae	6	11.3	4	4.9	10
Ichneumonidae	30	56.5	20	24.5	50
PLATYGASTROIDEA					
Platygastridae	0	0	1	1.2	1
Scelionidae	6	11.3	5	6.1	11
PROCTOTRUPOIDEA					
Diapriidae	1	1.9	6	7.3	7
Total	53	100.0	82	100.00	135

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