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SEASONALITY OF DOMINANT SPECIES OF BEES IN THE PANGA ECOLOGICAL RESERVE, CERRADO, UBERLÂNDIA, MG

Ana M.C. Carvalho[1] e Luci R. Bego[2]

ABSTRACT

This work was carried out in the Panga Ecological Reserve a cerrado area, neotropical savanna vegetation. Surveys of flower-visiting bees were done from April 1988 to April 1989. Bees were collected by net sweeping. *Trigona spinipes* Fabricius, *Tetragonisca angustula angustula* Latreille and *Apis mellifera* Linnaeus (Apidae) were the most frequent species in the area. Bee frequencies showed various pattern of seasonality. For example, the period in which most bees of *T. spinipes* were observed were July and September to November, and the preferential foraging time was variable. *T. angustula* visited flowers every time of the year. In general, Apidae, Anthophoridae, Halictidae and Megachilidae also exploited the flowers during all the study.

KEY WORDS: Insecta, Apoidea, flower-visiting, insect seasonality, Hymenoptera, ecology.

RESUMO

Sazonalidade de Espécies Dominantes de Abelhas na Reserva Ecológica do Panga, Cerrado, Uberlândia, MG

O trabalho foi realizado na Reserva Ecológica do Panga, cerrado, Uberlândia, MG, através de amostras de abelhas que visitam as flores, no período de abril 1988 a abril 1989. *Trigona spinipes* Fabricius, *Tetragonisca angustula angustula* Latreille e *Apis mellifera* Linnaeus (Apidae) foram as espécies mais abundantes na área. A sazonalidade foi variável de acordo com as diferentes espécies de abelhas. *T. spinipes* Fabricius foi observada em maior número em julho e de setembro a novembro, sendo que o horário preferencial de forrageamento foi variável. *T. angustula* visitou flores ao longo de todo o ano; a maioria das abelhas, Apidae, Anthophoridae, Halictidae e Megachilidae também exploravam as flores durante todo o estudo.

PALAVRAS-CHAVE: Insecta, Apoidea, visitantes de flores, sazonalidade dos insetos, Hymenoptera, ecologia.

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[1]Departamento de Biociência, Universidade Federal de Uberlândia, 38400-000, Uberlândia, MG.

[2]Departamento de Biologia, Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto, Universidade de São Paulo, Av. Bandeirantes, 3900, 14040-901, Ribeirão Preto, SP.

INTRODUCTION

In Brazil, there are few studies on bee/flower relationships, especially in natural vegetation such as the cerrado. This type of ecossystem occupied originally nearly around 20% of the brazilian territory (Eiten 1972). There are three detailed studies on this subject in different regions of cerrado in Brazil (Silveira 1989, Campos 1989, Pedro 1992). The present paper deals with flower visiting habits of the Apoidea, with emphasis on the seasonality, the preferential foraging time and the resource utilization in a natural area near Uberlândia, MG, on the southern limits of cerrado continuous distribution.

MATERIAL AND METHODS

Samples of bees were obtained periodically in an one hectare area of cerrado in Panga Ecological Reserve from April 1988 to April 1989. Observations were made from 8:00 to 16:00 on a 13-to 17-day intervals, totalizing 26 samples during the year. The area was subdivided in sixteen plots (12.5 x 50 m) and sampled by four collectors working independently in pairs. Two collectors visited half of the area and the other two visited the other half at the same moment. The collectors spent 15 minutes per transect and visited the area four times a day.

During the sampling period, bee species were collected by net sweeping. These individuals were labelled, flowers and visiting time recorded. Both bee specimens and plants were kept for further identification. Data were converted to the percentage ratios, applying the occurrence probability method of Kato *et al.* (1952) *apud* Sakagami & Matsumura (1967). This method is important to show the dominant species of bees. The data related to weather condition was recorded by the National Institute of Metereology, Uberlândia, MG (Fig. 1).

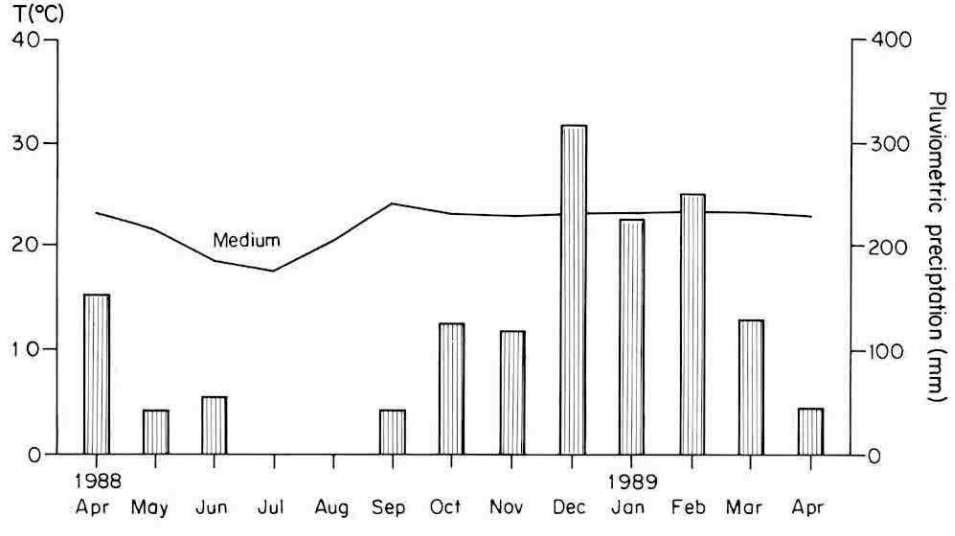

Figure 1. Climatic diagram in Uberlândia, MG, from April 1988 to April 1989.

RESULTS AND DISCUSSION

Thirty-four dominant species of bees were found (26.6% n = 128 species): Apidae (seven species) containing 612 specimens in a total amount of 634 individuals; Anthophoridae (15 species), representing 270 of 352 specimens; Halictidae (eight species) with 122 individuals of 171 bees of total and, finally, Megachilidae (four species) including 46 individuals of 65. These species are reported in Fig. 2 with their respective percentages, and lower and upper confidence limits. The ends of horizontal bars represent the confidence limits and the vertical

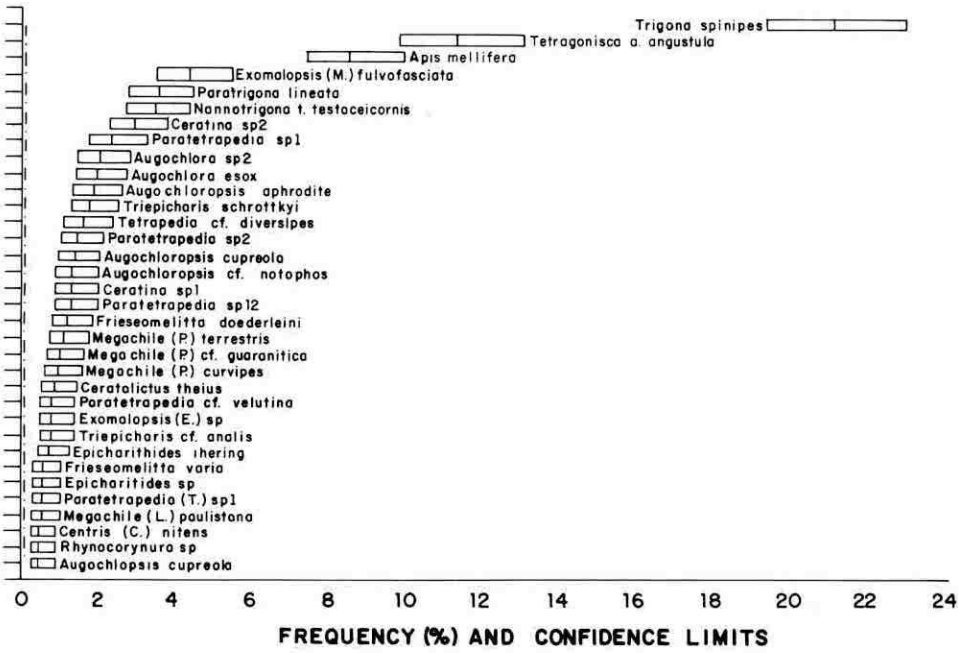

Figure 2. Relative abundance (%) of dominant species of Apoidea in the Panga Ecological Reserve, Cerrado, Uberlândia, MG, visualized by occurrence probability (horizontal bars = confidence limits; vertical bars = percentage ratio).

line across each bar, the percentage ratio. The vertical dash-dotted line, parallel to the Y axis, is the upper limit for K = 0 (0.24). The lower limit of all dominant species was greater than this value. The species were arranged from the top to the base in a descending order, according to the number of individuals captured. The most abundant species were *Trigona spinipes* Fabricius, *Tetragonisca angustula angustula* Latreille and *Apis mellifera* Linnaeus, which were collected independently of the months of the year. Such results can be explained by the large size of colonies and, consequently, a higher number of foraging bees. The distribution of such species along the collected period and the hour of capture for each family of Apoidea is shown on Fig. 3, and the Figs. 4 to 7 represent the distribution of individuals for each dominant species throughout the year (samples n = 26). In the Apidae family (Fig. 3A) two peaks of flower visit occurred. The first peak was on 9/July/1988, winter and dry period, and

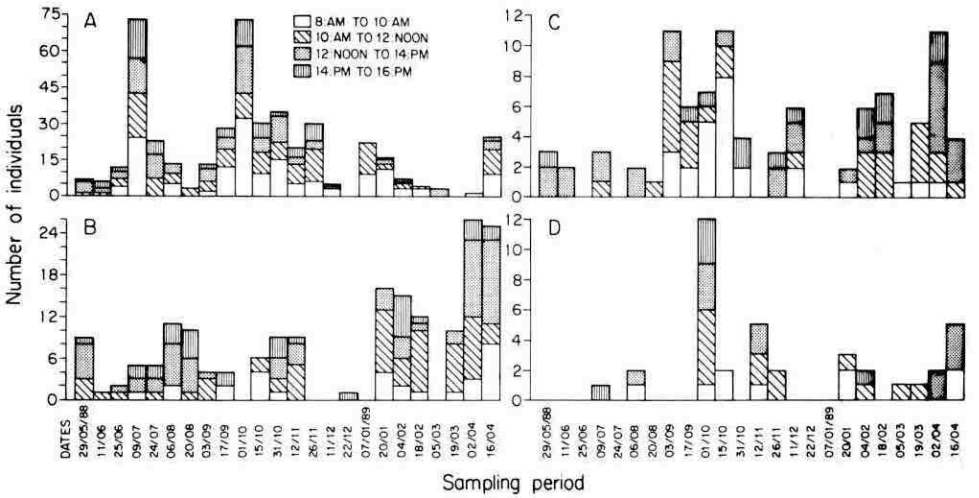

Figure 3. Number of individuals of dominant species of Apidae (A), Anthophoridae (B), Halictidae (C), Megachilidae (D) per time of capture during the sampling period.

the second, on 1/October/1988 (spring) with a remarkable pluviometric precipitation (Fig. 1). The foraging time for this family was more concentrated from 8:00 to 14:00. When figures 3A and 4 are compared, it is easy to verify that the first peak was due to the larger number of *T. spinipes*, and in the second, *A. mellifera* was mostly represented.

Albeit these two species were foraging continuously along the year, the period in which most bees were observed, *T. spinipes*, was July 1988 and September 1988 to November 1988. The preferential foraging time was variable. On 9/July/1988, *T. spinipes* was visiting flowers through out the day and in the other periods they were observed earlier mainly on the flowers (Fig. 4). *A mellifera* were more abundant in September and October 1988 flying preferentially on the flowers from 8:00 to 14:00, spring time (Figs. 4 and 1).

Anthophoridae bees occurred along the year though the most important samples were from January to April 1989 (summer and autumn). These bees visited flowers all through the day. However, they were collected more frequently from 10:00 to 14:00 (Fig. 3B).

Halictidae bees were well represented during whole year, albeit they were more frequent on the flowers from September to October 1988, and also February 1988 and April 1989, i.e. no hard period related to temperature and humidity (Fig. 1). In September and October they were active from 8:00 to 12:00, while in February and April they were captured later, from 10:00 to 16:00 (Fig. 3C). The Megachilidae were less well represented than other families. The peak of captures was in October 1988. In general, they did not show preference in flower-

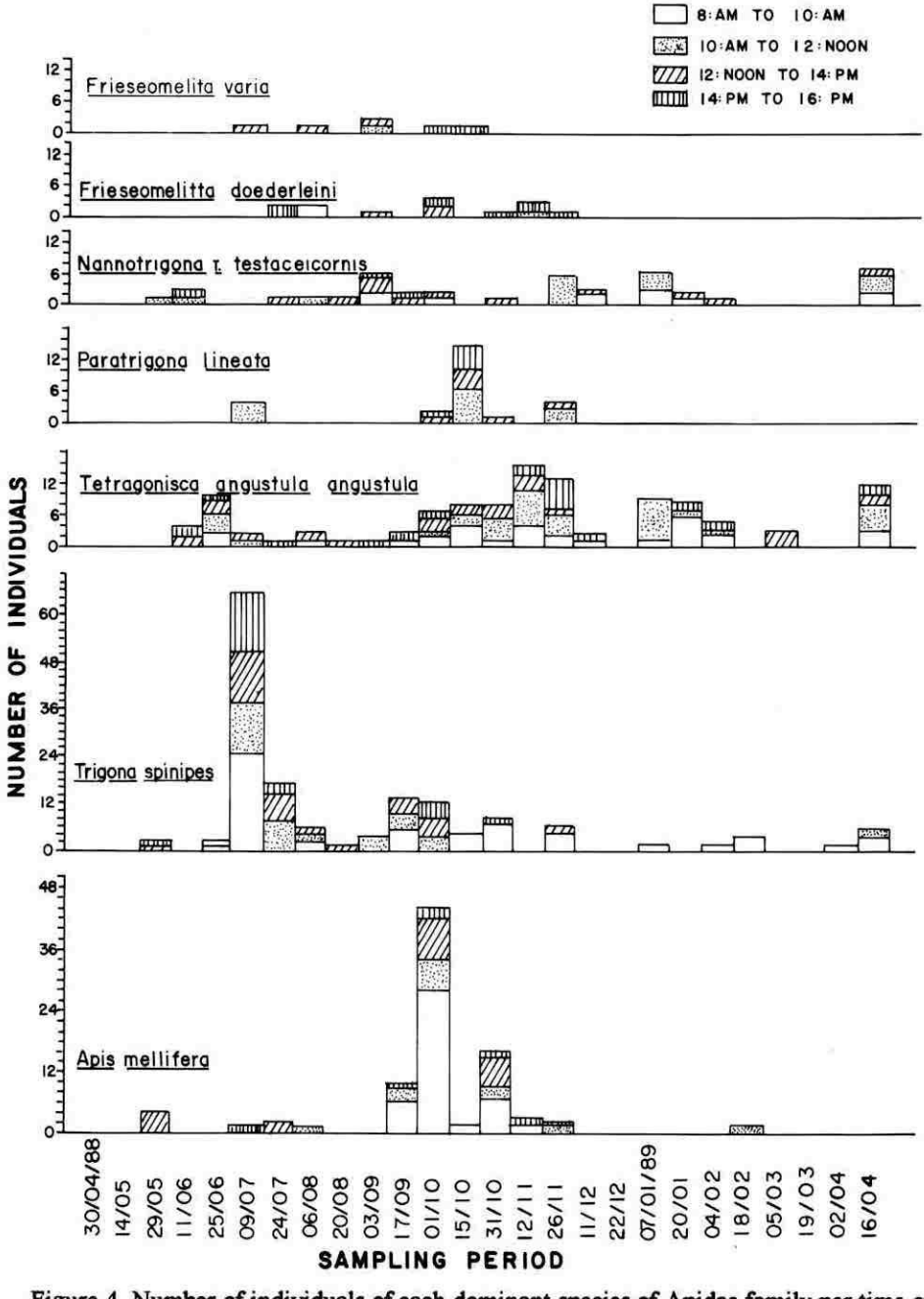

Figure 4. Number of individuals of each dominant species of Apidae family per time of capture during the sampling period.

visiting time (Fig. 3D). Other aspects can be observed concerning several other species of all families of bees.

As to Apidae, *A. mellifera, T. spinipes* and *T. angustula angustula*, the data of this paper are similar to those obtained by Knoll (1985). *T. angustula angustula*, the second more

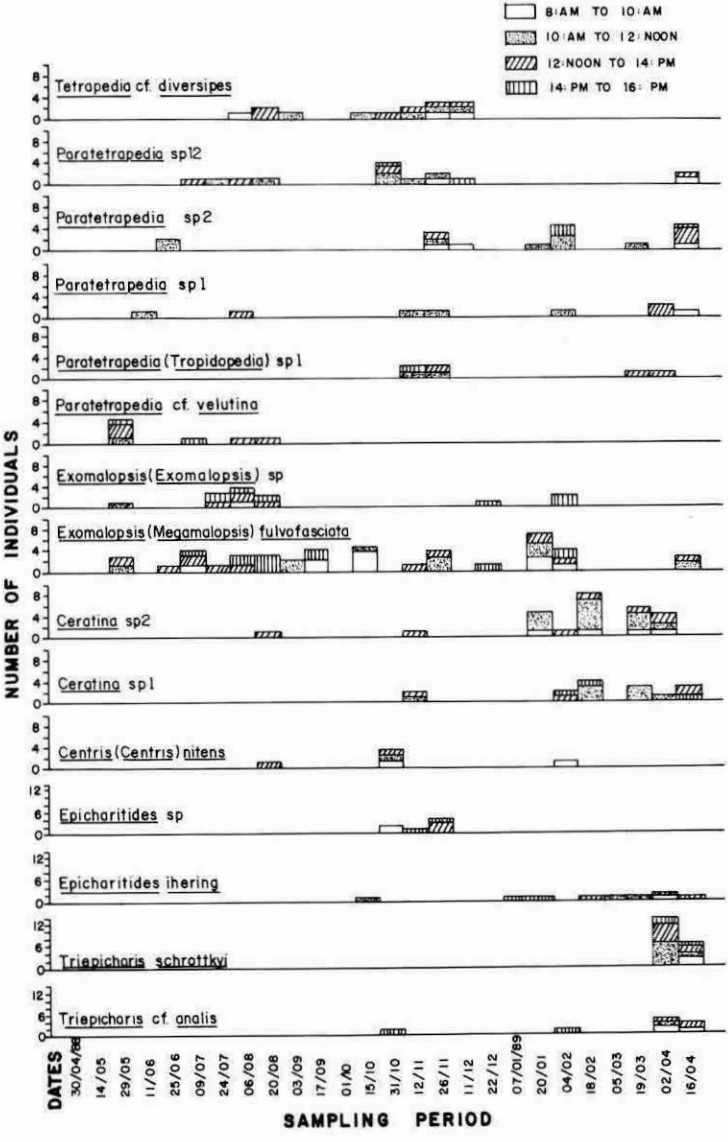

Figure 5. Number of individuals of each dominant species of Anthophoridae family per time of capture during the sampling period.

abundant dominant species of Apidae, visited flowers everytime of the year. However, they seem to be more active after 10:00. The other four dominant species of Apidae, were not collected regularly, except *Nannotrigona testaceicornis* Lepeletier that were frequent latter in the day, and occurred nearly all through the year. Finally, the other three Apidae species, *Paratrigona lineata* Lepeletier, *Frieseomelitta doederleini* Friese and *Frieseomelitta varia* Lepeletier were scarcelly represented (Fig. 4).

The bees of Anthophoridae, Halictidae and Megachilidae were less frequently sampled. Most of species were restricted to determined periods but there were some exceptions. For instance, *Exomalopsis (Megamalopsis) fulvofasciata* Smith (Anthophoridae), showed a long period of activity (Fig. 5). The same was true to *Augochlora exox* Vachal (Halictidae) (Fig. 6). The low frequencies of Megachilidae make it impossible to devise any activity pattern (Fig. 7). It is important to point out that the latter families are solitaries, parasites or primitively social, consequently, their number of individuals is low (Michener, 1974).

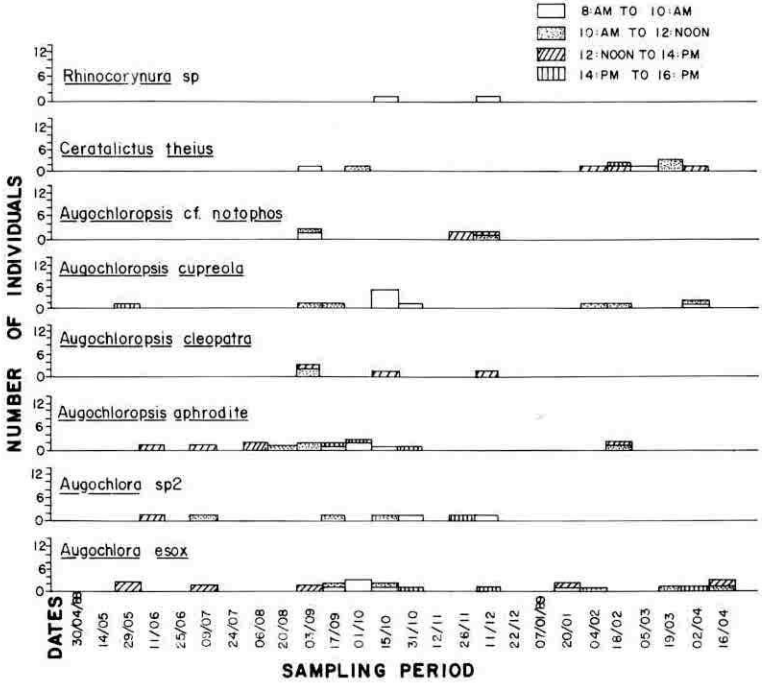

Figure 6. Number of individuals of each dominant species of Halictidae family per time of capture during the sampling period.

Although there are many species of Apidae in cerrado, they appeared in a small number when compared to some urban areas like São Paulo, SP (Knoll *et al.* 1987), where species of Apidae, mainly Apini and Meliponinae presented greater relative abundance.

To make a synthesis of some data here introduced, and analysing the results in the number of individuals of each family in the months in which they visited the flowers in this type of

cerrado, during their maximal peaks, the following events occurred: 1. In July 1988, the bees of *T. spinipes* (Apidae) were remarkably dominant when compared with the specimens of the other families represented more seldom. 2. In September 1988, the number of Halictidae individuals was also larger than that of the other families, except Apidae (Fig. 3C). 3. In October 1988, the Apidae family, mainly represented by *A. mellifera* (Fig. 4), predominated with a larger number of specimens in relation to those of Halictidae and Megachilidae, which

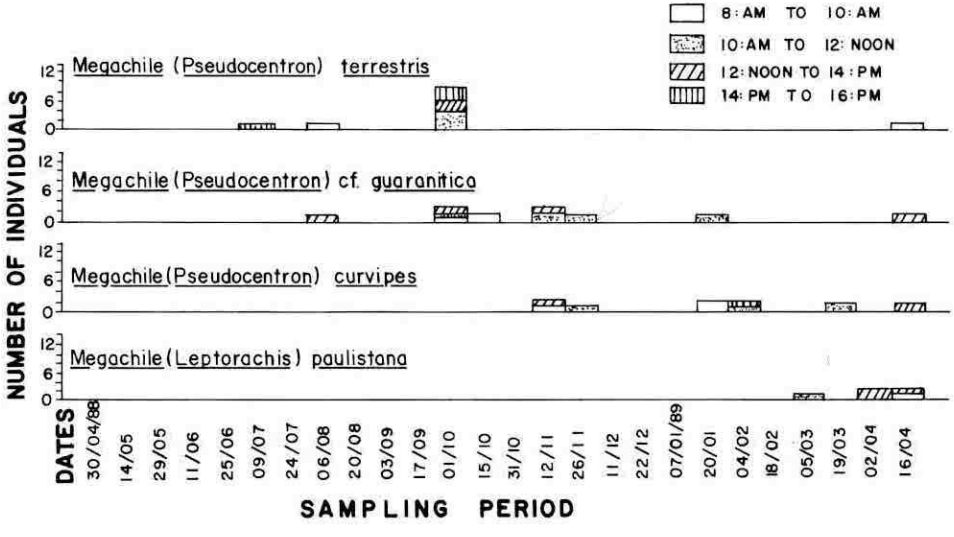

Figure 7. Number of individuals of each dominant species of Megachilidae family per time of capture during the sampling period.

visited the flowers in a small number. 4. In April 1989, bees of Anthophoridae (Fig. 3B) were more predominant than those of different families. Although there were activity overlaps between species of different families, it was observed that when a family presented its peak of activity, the others appeared in smaller numbers. This data suggest that there are differences in the seasonality of bees species and, also, in the flowering period of some vegetal species which are utilized by the bees, a factor that can possibly avoid competition.

The resource partitioning can occur more suddenly, and also presently, varying according to seasonality as a function of some bee adaptations (on morphological, physiological and behavioral characteristics). In this case, some species can be more competitive than others, exploiting better the resources utilization. Some species of bees have preferential resources since they are more aggressive, and, consequently, they restrain those other bees in searching for the resources in their preferential plants.

The data sampled by Carvalho & Bego (unpublished data) indicate that different species of bees can exploit more than one type of resource, i.e., they are polilectics, visiting a great diversity of vegetal species, independently of the seasons of the year.

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