DIVERSITY AND OVERLAP IN POLLEN SOURCES OF THREE SPECIES OF STINGLESS BEES (APIDAE, MELIPONINAE) IN COSTA RICA.

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INTRODUCTION

In this work the diversity of pollen sources and niche overlap of three species of stingless bees with different foraging strategies were determined. These species display different foraging strategies, *Trigona corvina* being an aggressive group forager, *Scaptotrigona pectoralis* being an intermediate group forager and *Tetragonisca angustula* being a solitary forager (Johnson, 1983). The main question in this work is if species with tendency to solitary foraging have a higher diversity in collected pollen than group foraging species.

MATERIALS AND METHODS

Research was carried out in Pozo Azul, Guanacaste province, Costa Rica at the end of the dry season. The vegetation corresponds to the tropical Dry Forest (Holdridge, 1992). The forest is highly disturbed and mainly of secondary growth.

Six colonies of Stingless bees were collected in the field within a radius of five km. Pollen samples were used in the palynological analysis (Erdtman methods, 1966). For every nest 3 slides with 2 samples were used. in total 1000 grains were counted in every sample and identified to type, using light microscopy lOx 100 (Silveira, 1995). Moreover, the relative volume of every pollen type was measured in order to obtain an estimate for importance. Only pollen types presenting more than 5% of the total volume are considered to be important.

RESULTS

A) Diversity

The number of pollen types present in the nest were low. An average the bees collected 20 different types of pollen, which only 3 to 5 types were important (Table 1).In figure 1, the percentage of 10 pollen types which occurred with highest volume in the samples are shown. Diversity was low for each species, and did net show difference between species (Table 2).

B) Overlap

The intraspecific pollen overlap was variable. Overlap was highest between nests of Scaptotrigona pectoralis (0.79 Horn's and 53 Renkonen index). The overlap in pollen types in all species was due to only 2 or 3 types. At interspecific level the overlap was less, the highest value was observed

between Trigona corvina nest 2 and Tetragonisca angustula nest 2 (Renkonen 23%, Horn's 0.34). The overlap in all species was the product of only 1 or 2 pollen types. Overlapping pollen types were almost always important types in all the sample (types number 2, **5,** and 18; figure 2).

Table 1. Number of pollen Types present in six nest of Stingless bees

Species of bees	Pollen types	Pollen types > 5 % Vol.
Scaptotrigona pectoralis N I	16	4
Scaptotrigona pectoralis N2	19	5
Tetragonisca angustula N 1	22	3
Tetragonisca angustula N 1	32	5
Trigona corvina *N I*	13	3
Trigona corvina *N2*	26	3

N=Number of nest

Table 2. Pollen diversity of three species of Stingless bees

Species of bees	Evenness
Scaptotrigona pectoralis	0.29 ± 0.07
Tetragonisca angiistula	0.28 ± 0.14
Trigona corvina	0.37 ± 0.04

CONCLUSION

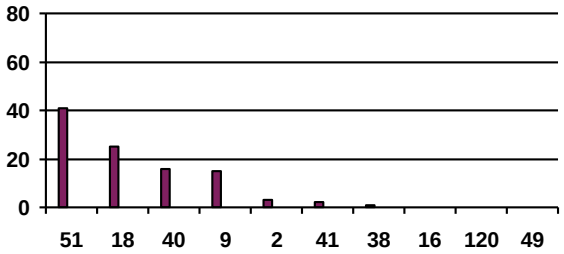
A) Diversity

Pollen diversity in various stingless bee nests in Pozo Azul, Costa Rica, was low and no differences were found between species. The low diversity in our experiment night be a result of the kind of vegetation present in this area. In Pozo Azul the deforestation rate was high, and the remnant of natural forest in consequence is small.

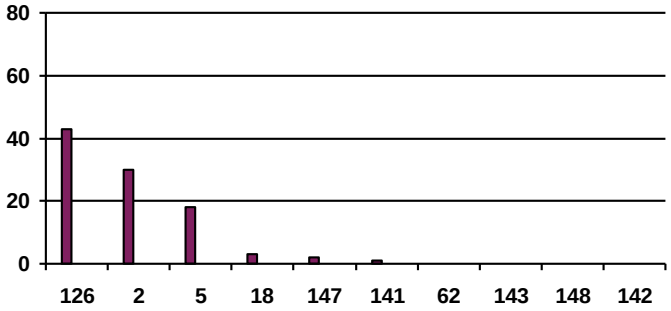
Moreover, diversity of pollen inside the nest might diminish when blooming of pollen increases in the year. In the dry season you often see big flowering trees. An example for Pozo Azul is *Bursera simaruba*, having many yellow flowers at the same time. On the other hand, pollen diversity inside the nest does not necessarily reflect diversity of pollen collected in the field because nothings known about pollen turnover in the nest.

B) Overlap

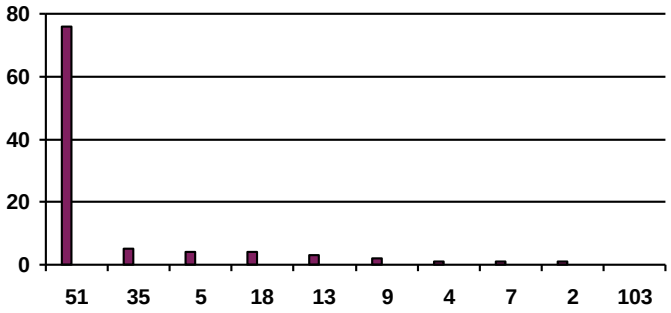
Intraspecific overlap in pollen types was low except for *Scaptotrigona pectoralis*, this might be the result of nest location, the two nest, of *Scaptotrigona pectorilis* being close, while the other nest were further apart. Pollen overlap at intraspecific level was low, only few pollen types being responsible for the total overlap between species. The majority of overlapping pollen types were the more important types in the nest. The more important types were a kind of Moraceae, *Bursera simaruba* and *Sapindus saponaria* .



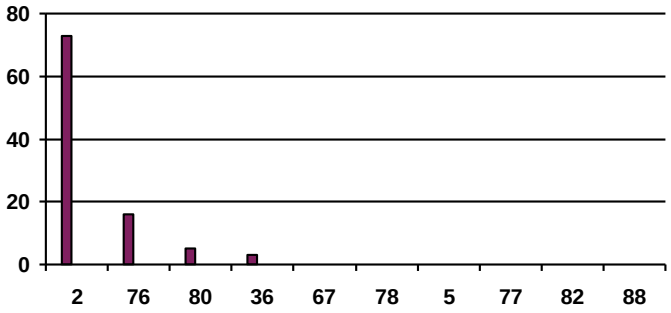
a) Scaptotrigona pectoralis



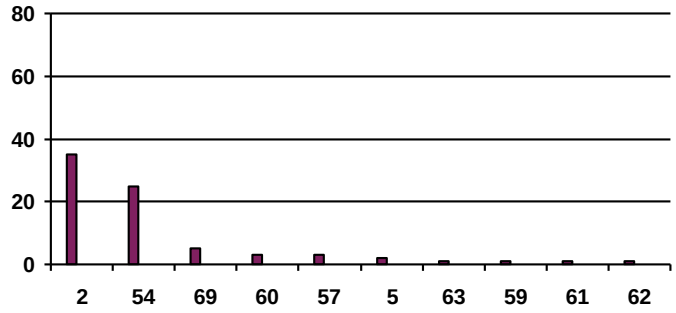
c) Trigona corvina nest I



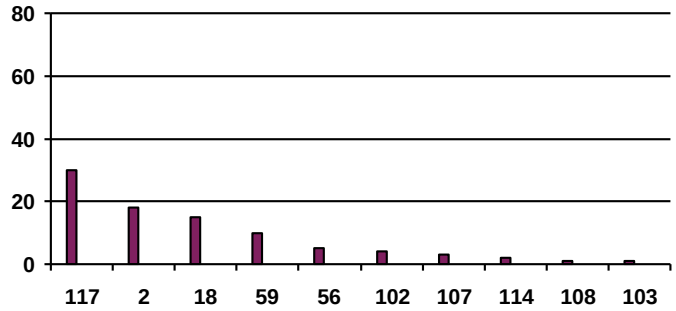
b) Scaptotrigona Pectoralis nest 2



e) Tetragonisca angustula nest I



d) Trigona corvina nest 2



f) Tetragonisca angustula nest 2

Fig 2. Percentages of the 10 most common pollen types in each nest. x-axis Pollen types y-axis percentages of total pollen volume.

LITERATURE

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