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Comparative pollen preferences by africanized honeybees *Apis mellifera* L. of two colonies in Pará de Minas, Minas Gerais, Brazil

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ABSTRACT

The aim of this study was to investigate the polliniferous floral sources used by *Apis mellifera* (L.) (africanized) in an apiary situated in Pará de Minas, Minas Gerais state, and evaluate the pollen prefences among the beehives. Two beehives of Langstroth type with frontal pollen trap collectors were used. The harvest was made from September 2007 to March 2008, with three samples of pollen pellets colected per month per beehive. The subsamples of 2 grams each were prepared according to the European standard melissopalynological method. A total of 56 pollen types were observed, identifying 43 genus and 32 families. The families that showed the major richness of pollen types were: Mimosaceae (8), Asteraceae (6), Fabaceae (3), Arecaceae (3), Euphorbiaceae (3), Rubiaceae (3), Caesalpiniaceae (2), Moraceae (2) and Myrtaceae (2). The most frequent pollen types (> 45%) were *Mimosa scabrella*, *Myrcia* and *Sorocea*. The results demonstrated a similarity regarding the preferences of floral sources during the major part of the time. There was a distinct utilization of floral sources among the pollen types of minor frequency. In spite of the strong antropic influence, the region showed a great polliniferous variety, which was an indicative of the potential for monofloral as well as heterofloral pollen production.

Key words: africanized *Apis mellifera*, Brazil, Pará de Minas, pollen pellets, polliniferous flora.

INTRODUCTION

Pollen is essential for the development of larvae that, for their survival, depend on available stocks in the combs. The foraging worker bees are adapted to regulate the pollen comb stores according to the intrinsic needs of the colony. The regulatory mechanisms that incite a smaller or bigger interest in searching for pollen in specific plants by the foraging worker bees are intricate and subject to controversy (Sagili and Pankiw 2007). According to Cook et al. (2003), the bigger the number of essential aminoacids a specific plant has, the more visited it is by *A. mellifera* honeybees. According to Schmidt and Buchmann (1993), honeybees collect pollen in various plant species and, thereby, maintain a good nutricional balance and a high dilution of toxic potential of alkaloids and other poisons. To Gary (1992), the nutrients in some bee pasture are requested by the hive, possibly because of evolutionary influences of the bees' harvest behavior (previous learning), as well as the different levels of competition among the colonies. Roulston et al. (2000) state that the protein variation in pollen grains cannot be directly related to the activity of the pollinizator, as the pollen of the zoophilous species is not richer in proteins than that of the anemophilous species.

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In spite of the complexity of factors, two are definitely important: the quantity of pollen stocked in the comb cells and the size of the breed (Dreller et al. 1999).

The results of the melissopalynological research are correlated with the offer of nectar and pollen in cronological terms, showing that, in differents periods during the year, certain flowers can be nectariferous or polliniferous, while in other periods both floral resources are available (Luz et al. 2007a). Apart from this, the pollen types observed in the pollen pellets can vary according to the region where they are offered, a factor which depends on the available surrounding bee pasture in the apiary vegetation. To know, it is one of the most important requisites in choosing a local for installation of the apiaries, because it reflects on the number of beehives and on the production of beekeeping derivates that they can bear.

In researching the botanical origin of apicultural derivates, one obtains a better management of the production according to the required international commercial qualification (Luz et al. 2007b). As melissopalynological analysis is rarely made on pollen pellets that are sold on the brazilian market, generally the floral origin that is written on the label is erroneous in which it indicates a vulgar name of a plant, which pollen is not contained in the product (Barth et al. 2009).

The Brazilian honeybee races are hybrids between the european honeybees and the southeast african honeybee, characterized by a great facility to swarm, high productivity, desease tolerance, good adaptation to colder climates and continuously working in low temperatures, while the european honeybees withdraw during these seasons (Embrapa Meio Norte 2003). The research by Villanueva-G and Roubik (2004) in Mexico on competitive pressure in relation to the pollen harvest among these races showed that the european honeybees, previously adapted to the local, exploited the variety of pollen sources more than the introduced african honeybees; but, in spite of this, the european honeybees utilized significantly only a few plants. The africanized honeybees showed more advantages than the european ones in exploring trees, grasses and sedges, and these were extensively utilized when pollen was available.

Even though the african honeybees were introduced in Brazil only some fifty years ago, what can be seen in the few existing palynological papers on this subject is a great variety of pollen types found in the pollen pellets, wich reveals an intrinsic adaptation between the africanized *Apis mellifera* and the native polliniferous flora (Barth 2004).

In Minas Gerais, Modro et al. (2007) presented physical-chemical and palynological results of pollen pellets from ten honey beehives, chosen in two apiaries in Viçosa, showing that the nutritional components were correlated with the frequency of specific pollen types, a fact attributed to a more balanced diet. Furthermore, these authors confirmed the occurrence of a selective harvest from different pollen sources possibly due to the intrinsic preference of each colony and to the exploitative competition behavior for the available floral sources.

STUDY AREA

The county of Pará de Minas, Minas Gerais, is located at 19°53′S of latitude, 44°31′W of longitude, and 970 m high. The climate in Pará de Minas is Cwa, according to Köppen's classification, where June, July and August are the driest months, and November, December and January the rainiest (Pinheiro and Batista 1998). It is located in the area embraced by Seasonal Semideciduous Forest, in the transition between the Atlantic Forest domains and Cerrado (IBGE 1993), with many arboreal species of Leguminosae (*lato sensu*), Myrtaceae, Lauraceae, Rubiaceae, Annonaceae, Meliaceae, Euphorbiaceae and Flacourtiaceae mainly along the margins of the waterbodies (Meyer et al. 2004). During the driest periods of the year, the region is subject to forest fires, many times caused by the catlle breeders. The apiary selected for the study is close to a natural forest fragment with few introduced fructiferous and ornamental specimens of *Coreopsis lanceolata* L. ("Yellow daisy"), *Vernonia polysphaera* Baker ("Assa-peixe"), *Taraxacum officinale* Weber ex FH Wigg ("Dandelion") and *Achyrocline satureioides* (Lam.) DC. ("Camomile") (Asteraceae); *Begonia* sp (Begoniaceae); *Ipomea* sp. and *Ipomea alba* L. ("Moonflower") (Convolvulaceae); *Chamaecrista* sp and *Stryphnodendron adstringens* (Martius) Coville ("Barbatimão") (Fabaceae); *Persea americana* Mill. ("Avocado") (Lauraceae); *Abelmoschus esculentus* (L.) Moench ("Okra") (Malvaceae); *Miconia albicans* (Sw.) Triana ("Canela-de-velha") (Melastomataceae); *Calliandra brevipes* Benth ("Pink Powderpuff") and *Mimosa* sp. (Mimosaceae); *Solanum lycocarpum* St. Hil. ("Lobeira" or "Fruta-de-lobo") and *Solanum* sp. (Solanaceae); *Symplocos* sp. (Symplocaceae); *Lantana camara* L. ("Spanish Flag") and *Lantana* sp. (Verbenaceae), among others, apart from ruderal vegetation (heliophyte plants) at the neighborhood pasturelands.

The aim of this study was to investigate the influence of the local flora on the pollen harvest by the *Apis mellifera* L. (africanized) from two beehives in an apiary in Pará de Minas, Minas Gerais, in order to examine the similarity in polliniferous sources preferences.

MATERIALS AND METHODS

Two honeybee colonies of *Apis mellifera* L. (africanized) were selected for harvest of pollen pellets, installed in beehives of Langstroth type, positioned side by side in the apiary, each one with a nest and ten honeycombs. Each beehive was equipped with a frontal pollen trap (Jean-Prost 1987).

The harvest of pollen pellets was gathered between the 15th of September and 18th of November in 2007, and between the 16th of February and the 29th of March in 2008, with a seven day interval among each harvest. At the same time, the pollen pellets were collected from the pollen traps in both beehives, summing a total of twenty-nine samples, as no pollen was collected on 01/03/2008 in one of them. No harvest was possible during the months of December and January due to rainfalls and invasion of ants that weakened the beehives.

The samples of pollen pellets from beehive A were collected on the following dates: A1 – 15/09/2007, A2 – 22/09/2007, A3 – 29/09/2007, A4 – 06/10/2007, A5 – 13/10/2007, A6 – 20/10/2007, A7 – 03/11/2007, A8 – 11/11/2007, A9 – 18/11/2007, A10 – 16/02/2008, A11 – 23/02/2008, A12 – 01/03/2008, A13 – 15/03/2008, A14 – 22/03/2008 and A15 – 29/03/2008. The samples from beehive B were collected as follows: B1 – 15/09/2007, B2 – 22/09/2007, B3 – 29/09/2007, B4 – 06/10/2007, B5 – 13/10/2007, B6 – 20/10/2007, B7 – 03/11/2007, B8 – 11/11/2007, B9 – 18/11/2007, B10 – 16/02/2008, B11 – 23/02/2008, B12 – there was no pollen in the trap, B13 – 15/03/2008, B14 – 22/03/2008 and B15 – 29/03/2008.

Each pollen sample was manually cleansed and kept in a refrigerator. In sequence, it was homogenized and 2 g (wet weight) of it were macerated and extracted with ethanol. The preparation of the pollen pellets followed the standard European methodology (Maurizio and Louveaux 1965) without the use of acetolysis and with some modifications as suggested by Barth et al. (2009).

The identification of the pollen types was based upon the reference pollen slide collection of the Institute of Botany in São Paulo, as well as on specialized literature data, (Melhem et al. 1984, Roubik and Moreno 1991, Barth 1970a, b, c, d, 1989).

Aproximately 500 pollen grains per sample were counted. The pollen classes and terminology follow Zander (1924) and were implemented later by Louveaux et al. (1978), comprising the dominant pollen class (> 45% of the total pollen sum), the accessory pollen class (15-45% of the total pollen sum) and the important pollen class, subdivided in isolated (3-15% of the total pollen sum) and occasional (< 3% of the total pollen sum).

The Principal Component Analysis (PCA) was performed in order to verify the pollen preference in the beehives A and B, by which the pollen types were grouped per month (Aset and Bset = september, Aout and Bout = october, Anov and Bnov = november, Afev and Bfev = february, Amarc and Bmarc = march). The matrix comprised the absolute value of all taxa found in each sample. The absolute numerical variables were transformed into natural logarithm [log (x+1)] using the FITOPAC program (Shepherd 1996), and thereafter the ordination was done through a covariance matrix using PC-ORD 4.0 (McCune and Mefford 1999). The MINITAB program (2003) was used to compose the percentage similarity dendrogram among the pollen pellet samples.

The illustrations of the pollen grains were digitally obtained using a OLYMPUS BX 50 microscope equipped with a video camera and a PC with the program IMAGE PRO-PLUS 3.1 for Windows.

RESULTS

In the twenty-nine samples of pollen pellets from the beehives A and B, a total of 56 pollen types were observed, comprising 43 genera and 32 families. There were found 46 pollen types in beehive A and 44 in beehive B, of which some pollen types were only found in beehive A (Apocynaceae, *Chenopodium*, *Commelina*, *Elephantopus*, Euphorbiaceae, Fabaceae 2, *Ludwigia*, *Mimosa caesalpinaefolia*, *Mimosa verrucosa*, *Struthanthus*, *Trema* and *Vigna*) while others were only found in beehive B (*Acacia*, *Bauhinia*, Bignoniaceae, *Euterpe/Syagrus*, *Ilex*, *Inga*, *Jacquemontia*, *Mimosa selloi*, *Piptadenia* and *Polygonum*) (Table I and Figs. 1 to 20). The families that showed the greatest richness in pollen types were: Mimosaceae (8), Asteraceae (6), Arecaceae (3), Euphorbiaceae (3), Fabaceae (3), Rubiaceae (3), Caesalpiniaceae (2), Moraceae (2) and Myrtaceae (2).

In both beehives, the heterofloral samples were predominant most of the time. The month of September (samples A1, A2, A3, B1, B2 and B3) showed the greatest pollen richness (28) (Table I).

The most frequent pollen types (> 45%) in beehive A were *Mimosa scabrella*, *Myrcia* and *Sorocea*, while in beehive B were *Mimosa scabrella* and *Myrcia* (Table I).

Monofloral samples (pollen types with a count superior to 90%) were found in beehive A on 06/10/2007 with *Sorocea*, on 20/10/2007 with *Myrcia* and, 15/03/2008, 22/03/2008 and 29/03/2008 with *Mimosa scabrella* (Table I). In beehive B the monofloral samples were found on 29/09/2007, 06/10/2007, 13/10/2007, 20/10/2007 and 11/11/2007 with *Myrcia*, and 16/02/2008 and 29/03/2008 with *Mimosa scabrella*. The coinciding periods with the biggetst harvest by the honeybees from the same polliniferous source were on 20/10/2007, with respect to *Myrcia*, and 29/03/2008, with respect to *Mimosa scabrella*. On 01/03/2008 no pollen pellet was captured in the pollen trap in beehive B.

The variability among the samples of pollen pellets for each month from the two beehives comprised 77,8% on the two first axis in the Principal Component Analysis (PCA) (Fig. 1). Considering the same harvest periods, the correlation among pollen pellets from the two beehives showed a great similarity with respect to the ocurrence of the pollen types. The pollen types *Myrcia*, *Sorocea* and *Cecropia* were the main characteristic components in the PCA in the months of September, October and November 2007, while *Mimosa scabrella*, Asteraceae, Poaceae, *Croton* and *Tetrapteris* were in February and March 2008.

There was a distinct usage of floral sources when the two principle anual harvest periods were compared (September to November 2007, and February to March 2008), given that the pollen pellets formed two main groups with 50,13% of similarity among them (Fig. 2). The samples from September to November showed a similarity of 90,34% between the beehives (Fig. 2). The biggest porcentage similarity in the usage of pollen sources (99,48%) was noticed in the samples from the period between February and March 2008 (samples Afev, Bfev, Amarc and Bmarc), which demonstrates the simultaneous harvest by the honeybees from the two beehives from the flowers of the Asteraceae family and *Mimosa scabrella*.

DISCUSSION

Researches from *Apis mellifera* pollen pellets collected in Rio de Janeiro (Barth 1973, 1989, Barth and Luz 1998, Luz and Barth 2001, Luz et al. 2007a) showed that the most common pollen types were *Eupatorium*, *Ricinus communis* and Sapindaceae, together with *Cecropia*, *Borreria*, *Gochnatia*, *Panicum*, *Spondias*, *Triumfetta* and *Vernonia*. Pollen from *Eucalyptus* and Mimosaceae (identified taxa: *Albizia lebbeck*, *Piptadenia* sp., *Schrankia* sp., *Mimosa bimucronata/M. caesalpiniaefolia* and *Mimosa scabrella/M. pudica*) were observed a few times. Various of these pollen types were found in the pollen pellet samples from Pará de Minas, reflecting a characteristic vegetation of the Southeast Brazil.

According to the results obtained in the pollen pellet samples from the apiary in Pará de Minas, during the second half of September 2007, there was a predominance of *Cecropia*, *Myrcia*, *Ricinus*, *Sorocea* and *Trema*. On the other hand, a research by Modro et al. (2007) in Viçosa (Minas Gerais), in an apiary of *Apis mellifera* located in an area of coffee plantation with abandoned pasture, during the same month, there was a predominance of *Cecropia*, *Coffea* and *Eucalyptus* in the pollen pellets. During the first half of October, *Myrcia* and *Sorocea* predominated in Pará de Minas, and *Myrcia* and *Coffea* in Viçosa. During the second half of October, the pollen from Pará de Minas was monofloral (*Myrcia*) while in Viçosa it was heterofloral, consisting of *Myrcia*, *Piper*, Anacardiaceae and *Senecio*. The first half of November in Pará de Minas showed a predominance of bifloral pollen pellet, *Myrcia* and *Sorocea*, while in Viçosa there was an heterofloral predominance, consisting of *Myrcia*, *Coffea*, *Anadenanthera* and *Piper*.

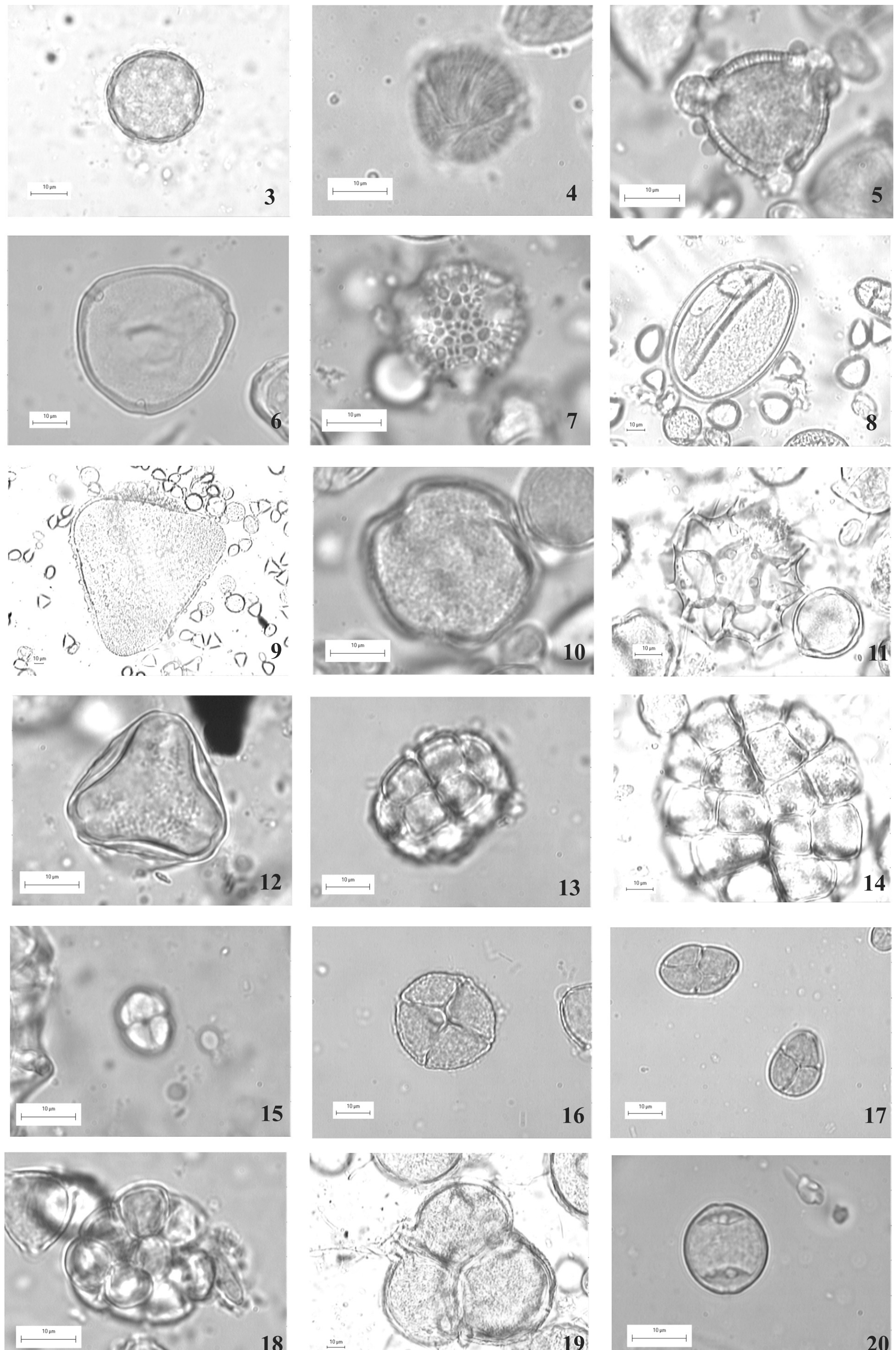
TABLE I

List of occurrence and frequencies of pollen types from pollen loads from beehives A and B harvested from September 2007 to March 2008, Pará de Minas, Minas Gerais State. PD = dominant pollen (> 45%); PA = accessory pollen (15%-45%); PIi = isolate pollen (3%-15%); PIo = occasional pollen (< 3%).

Pollen types	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15
Acacia															
Aegiphila					PIo			PIo	PIo						
Anadenanthera								PIo	PIo						
Apocynaceae		PIo													
Arecaceae						PIo									
Asteraceae									PIo	PIi	PIo	PIi	PA	PIo	PIo
Astrocaryum					PIo			PIo	PIo						
Baccharis								PIo	PIo						
Bacopa	PIo														
Bauhinia															
Bignoniaceae															
Caesalpinia	PIo														
Cecropia	PIi	PA	PIo	PIo		PIi	PIo		PIo	PIo	PIo				
Chenopodium										PIo					
Coffea								PIo	PIo						
Crysophyllum											PIo	PIo	PIo		
Commelina										PIo	PIo				
Croton	PIo									PIi	PIi	PIo	PIi	PIo	PIo
Elephantopus													PIo		
Eucalyptus	PIo			PIo	PIo										
Eupatorium	PIi	PIi	PIo							PIo	PIo	PIo			
Euphorbiaceae		PIo													
Euterpe/Syagrus															
Fabaceae 1	PIo	PIo	PIo												
Fabaceae 2			PIo												
Gochnatia	PIo				PIo	PIo								PIo	
Hyptis													PIo		
Ilex															
Inga															
Jacquemontia															
Ludwigia	PIo	PIo	PIo	PIo											
Melastomataceae	PIi	PIi		PIo	PIi			PIo	PIo						
Mimosa caesalpinaefolia	PIo														
Mimosa scabrella										PD	PD	PD	PD	PD	PD
Mimosa verrucosa											PIo	PIo	PIo		
Mimosa selloi															
Montanoa														PIo	PIo
Myrcia	PIo	PA	PIo	PIo	PA	PD	PA	PD	PA	PIo	PIo	PIo		PIo	PIo
Persea	PIo														
Piper			PIo												
Piptadenia															
Poaceae								PIo		PIo	PIo	PIo	PIo	PIo	PIo
Polygonum															
Richardia										PIo	PIo	PIo	PIo	PIo	PIo
Ricinus	PA	PIi	PIi	PIi	PIi	PIo	PIo			PIo	PIo	PIo	PIo		
Rubiaceae	PIo	PIo													
Sida													PIo		
Sorocea	PD	PD	PA	PD	PD	PIi	PD	PA	PD						
Struthanthus	PIo		PIo		PIo										
Tapirira									PIi						
Tetrapteris	PIo	PIo								PIo	PIo	PIo	PIi		PIo
Trema			PA												
Typha			PIo			PIo									
Vernonia			PIo							PIo	PIo		PIo		
Vigna	PIo														
Zanthoxylum												PIo			
Various not identified			PIo				PIo			PIo	PIo	PIo	PIo		

TABLE I (continuation)

Pollen types	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15
Acacia												–			PIo
Aegiphila	PIo				PIo		PIo	PIo				–			PIo
Anadenanthera						PIo	PIo	PIo	PIo			–			
Apocynaceae												–			
Arecaceae					PIo		PIo		PIo		PIo	–			
Asteraceae									PIo		PIi	–	PA		
Astrocaryum						PIo	PIo	PIo	PIo			–			
Baccharis	PIo											–			
Bacopa									PIo			–			
Bauhinia									PIo			–			
Bignoniaceae					PIo							–			
Caesalpinia	PIo											–			
Cecropia	PA	PA	PIo	PIo	PIo		PIi	PIo	PIo		PIo	–			
Chenopodium												–			
Coffea	PIo						PIo	PIo	PIo			–			
Crysophyllum											PIo	–			
Commelina												–			
Croton								PIo	PIo	PIo	PIo	–	PIi	PIi	PIo
Elephantopus												–			
Eucalyptus		PIo	PIo	PIo	PIo		PIo					–			PIo
Eupatorium				PIo	PIo			PIo				–			
Euphorbiaceae												–			
Euterpe/Syagrus	PIo								PIo			–			
Fabaceae 1	PIo	PIo	PIo	PIo	PIo		PIo					–			
Fabaceae 2												–			
Gochnatia				PIo	PIo							–	PIo		
Hyptis			PIo									–	PIo		
Ilex	PIi											–			
Inga	PIo		PIo	PIo	PIo							–			
Jacquemontia											PIo	–	PIo		
Ludwigia												–			
Melastomataceae	PIo											–			
Mimosa caesalpinaefolia												–			
Mimosa scabrella										PD	PD	–	PD	PD	PD
Mimosa verrucosa												–			
Mimosa selloi											PIo	–			Pio
Montanoa											PIo	–	PIo		
Myrcia	PD	PD	PD	PD	PD	PD	PD	PD	PD		PIo	–		PIi	PIo
Persea	PIo											–			
Piper												–			PIo
Piptadenia									PIo			–			
Poaceae									PIo	PIi	PIo	–	PIo	PIi	PIi
Polygonum											PIo	–			
Richardia											PIo	–	PIo		
Ricinus				PIo						PIo	PIo	–	PIo	PIo	PIo
Rubiaceae	PIo			PIo	PIo				PIo			–			
Sida												–	PIo		
Sorocea				PIi	PIo		PA	PIi	PA			–			
Struthanthus												–			
Tapirira	PIi	PIo										–			
Tetrapteris											PIo	–	PIo		
Trema												–			
Typha			PIo	PIo	PIo		PIo					–			
Vernonia	PIo						PIo				PIo	–			
Vigna												–			
Zanthoxylum												–	PIo		
Various not identified											PIo	–			



(Figs. 3–20) – Photographs of pollen types from pollen pellets of Pará de Minas, MG. **3:** Amaranthaceae, *Chenopodium*. **4-5:** Anacardiaceae. **4.** *Tapirira*, surface. **5.** it Tapirira, optical section. **6:** Apocynaceae. **7:** Aquifoliaceae, *Ilex*. **8:** Arecaceae, *Euterpe/Syagrus*. **9:** Caesalpiniaceae, *Bauhinia*. **10-11:** Fabaceae. **10.** Type 1. **11.** *Vigna*. **12:** Loranthaceae, *Struthanthus*. **13-18:** Mimosaceae. **13.** *Acacia*. **14.** *Inga*. **15.** *Mimosa caesalpiniaefolia*. **16.** *Mimosa selloi*. **17.** *Mimosa verrucosa*. **18.** *Piptadenia*. **19:** Onagraceae, *Ludwigia*. **20:** Ulmaceae, *Trema*. Scales = 10μ.

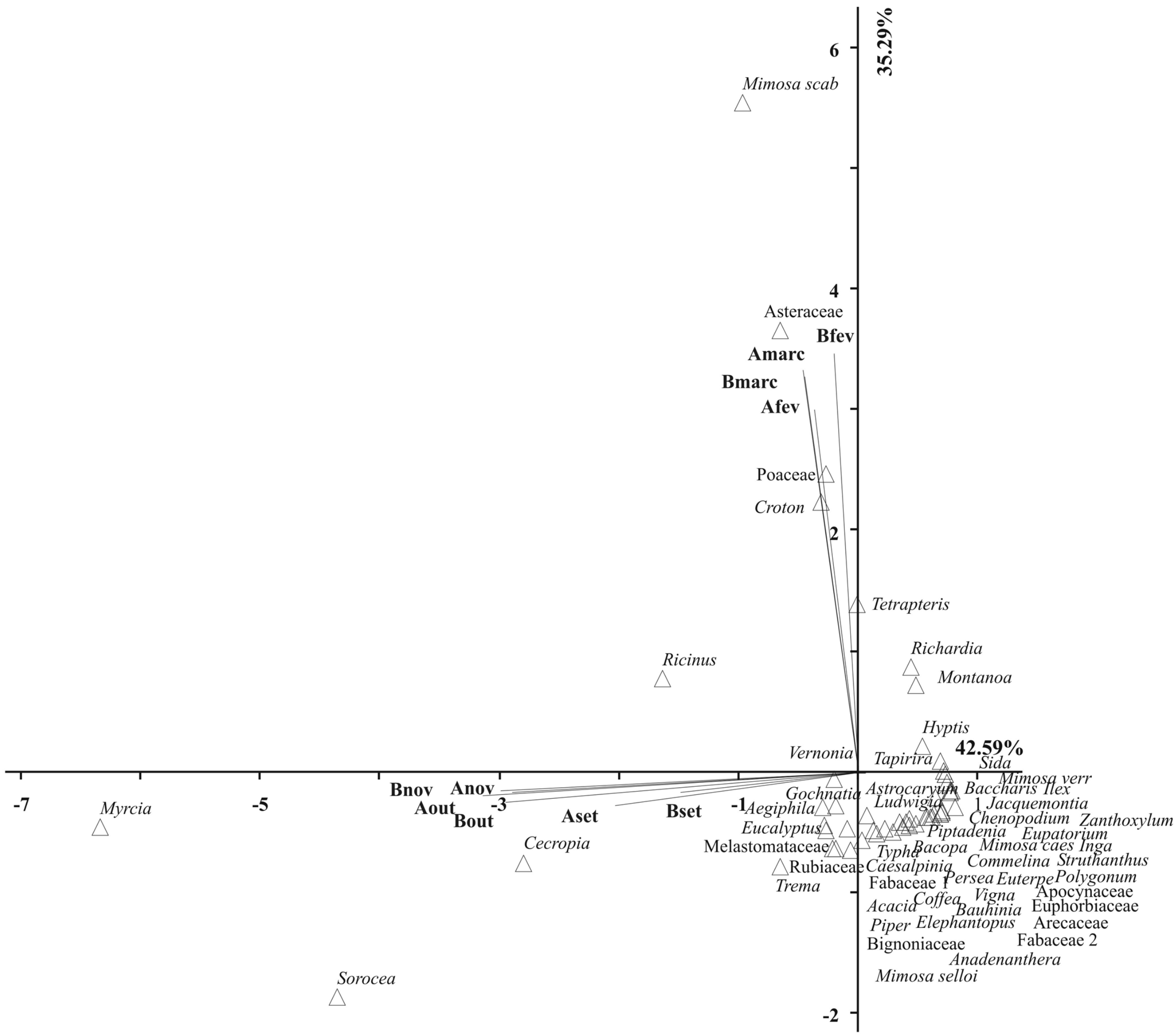


Fig. 1 – PCA biplot for pollen types in pollen pellets samples per month from Pará de Minas, Minas Gerais State, using the absolute value of the variables per sample.

During the second half of the same month, *Myrcia* and *Sorocea* once again represented the biggest percentage in the pollen pellets in the apiary in Pará de Minas, while in Viçosa *Alchornea* and *Cecropia* predominated. A comparison of the results shows an occurrence of the majority of pollen types in the pollen pellets from the two locations of study. However, only *Myrcia* and *Cecropia* were observed in coinciding periods, showing discordances in many other aspects include frequency values, which shows the floristic diversity between the two apiaries, as the apiary in Pará de Minas is located in an opened area in the Seasonal Semideciduous Forest with introduced frutiferous and ornamental species, while in Viçosa it is located in an abandoned pasture with coffee plantation.

Barreto (unpublished data) also evaluated the production of pollen pellets from *Apis mellifera* collected with pollen traps in Viçosa, but in many periods of the year (April to June) of those carried out in Pará de Minas, the tree *Mabea fistulifera* Mart proved to be the

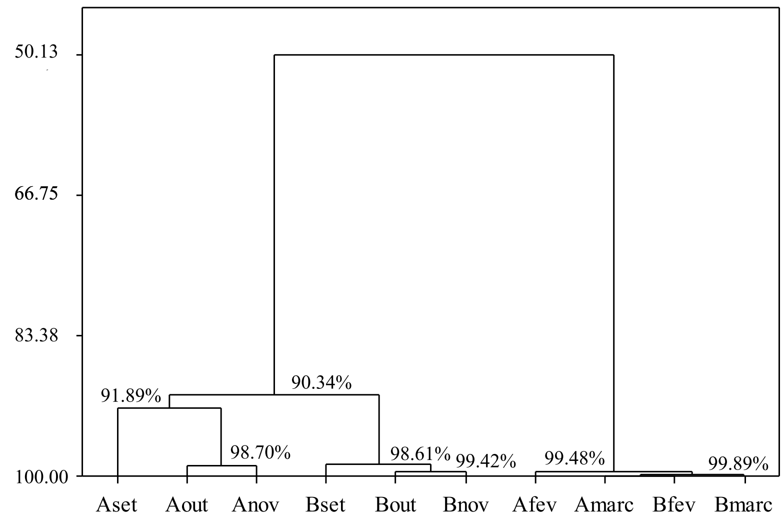


Fig. 2 – Percentage similarity dendrogram carried out on pollen data per month from beehive A (Aset, Aout, Anov, Afev and Amarc) and B (Bset, Bout, Bnov, Bfev and Bmarc), Pará de Minas, Minas Gerais State.

main supplier of pollen, followed by the representatives of Asteraceae. In Pará de Minas, the Asteraceae was also an important source of pollen, however, this wasn't observed in the harvest of *Mabea* pollen type during the analyzed period.

The referred study by Modro et al. (2007) in an apiary in an abandoned pasture with coffee plantation in Viçosa also analyzed the pollen preference among five beehives that showed differences in the harvest of pollen sources over the time. This difference was attributed to the previous learning in every colony, because in areas of abandonded pasture, there is no uniformity in the plant species and its blossom times are short, which creates high competition. In Pará de Minas, the main pollen types were very similar and, in the PCA, the samples from the same month were grouped in pairs between the two beehives, even though the beehives showed differences regarding the main floral sources when the samples were analyzed weekly. The main difference regarding the weekly samples was the presence of *Trema*, exclusively harvested in beehive A on 29/09/2007, which showed a frequency above 15%. There was also a range between the beehives in Pará de Minas when certain pollen types were observed occurring only in the pollen pellets of beehive A or beehive B, mainly *Acacia*, Apocynaceae, *Bauhinia*, Bignoniaceae, *Chenopodium*, *Commelina*, *Elephantopus*, Euphorbiaceae, *Euterpe/Syagrus*, Fabaceae 2, *Ilex*, *Inga*, *Jacquemontia*, *Ludwigia*, *Mimosa caesalpinaefolia*, *Mimosa selloi*, *Mimosa verrucosa*, *Piptadenia*, *Polygonum*, *Struthanthus*, *Trema* and *Vigna*, most of them harvested in short periods and with low percentage values. According to Villanueva-G and Roubik (2004), the africanized honeybees compete among themselves for food sources, which can cause a decrease of the diet diversity in every colony and an increase of specialization in specific pollen sources, many times used by one of them only as a function of intense competition. In Pará de Minas, this fact may have influenced the honeybees forraging behaviour.

There is a low similarity (50,13%) between the two major harvest periods (September to November 2007, and February to March 2008), which indicates the difference in blossom phases and the phenological plant development in the beehive sourroundings.

We do not know the reason why there had not accumulated any pollen in the pollen trap in beehive B in 01/03/2008 however, there was a big fire close to the local that could have caused this fact. The lack of pollen during this period weakened the beehive.

The great richness of the pollen types in the samples in Pará de Minas shows that *Apis mellifera* collected pollen in many floral sources, including the plants that less occurred in the area. The harvest in various sources was attributed to a richer and more balanced diet of these bees, according to Modro et al. (2007) in Viçosa.

CONCLUSIONS

The pollen types recognized in the pollen pellets collected by *Apis mellifera* in Pará de Minas were considered characteristc of the Southeast region in Brazil, mainly from disturbed areas in the forest, proved by the presence of pollen from heliophyte and ruderal plants (Asteraceae, *Cecropia*, *Mimosa scabrella*, *Ricinus*, *Sorocea*, *Trema*, among others).

There was no dissimilarity among the main pollen types in the monthly samples from the two beehives. This fact suggests a similar preference of pollen sources, even when differences occurred regarding the main weekly analyzed floral sources, which may be considered a function of competition.

September was the month when the honeybees took most advantage of the floral sources in the vegetation nearby the apiary. The periods that coincided with the biggest harvest from the same pollen source (*Myrcia* and *Mimosa scabrella*), October 2007 and March 2008, respectively, were caused by the ample blossoming of these plants in the environment around the apiary.

Some pollen types from less common plants occurred in one or the other of the two beehives. This suggests a previous learning process due to intrinsic preferences of each colony or different competition levels in the search for pollen sources. Both possibilities may occur in a vegetation characterized by non-uniformity regarding plant species, wich in turn have short blossom periods.

There was a dissimilarity among the pollen sources when the two main flowering periods of September to November 2007, and February to March 2008, were compared.

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RESUMO

O objetivo deste trabalho foi conhecer as fontes poliníferas utilizadas por *Apis mellifera* (L.) (africanizadas) em um apiário localizado em Pará de Minas, Minas Gerais e avaliar as preferências alimentares entre colméias. Para a pesquisa foram utilizadas duas colméias do tipo Langstroth com coletores de pólen do tipo dianteiro. As coletas foram realizadas de setembro de 2007 a março de 2008, perfazendo um total mensal de 3 lotes de amostras de cargas de pólen por colméia. As subamostras de 2g foram preparadas segundo o método melissopalinológico padrão europeu. Foram observados 56 tipos polínicos, reconhecendo-se 43 gêneros e 32 famílias. As famílias que apresentaram maior riqueza de tipos polínicos foram: Mimosaceae (8), Asteraceae (6), Fabaceae (3), Arecaceae (3), Euphorbiaceae (3), Rubiaceae (3), Caesalpiniaceae (2), Moraceae (2) e Myrtaceae (2). Os tipos polínicos mais freqüentes (> 45%) foram *Mimosa scabrella*, *Myrcia* e *Sorocea*. Os resultados demonstraram similaridade na preferência das fontes florais na maior parte do tempo. Uma distinta utilização das fontes florais se deu entre os tipos polínicos de menor freqüência. Apesar de sofrer forte influência antrópica, a região demonstrou grande variedade polinífera, o que foi um indicativo da capacidade de produção tanto de pólen apícola monofloral quanto heterofloral.

Palavras-chave: *Apis mellifera* africanizada, Brasil, Pará de Minas, cargas de pólen, flora polinífera.

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