PLANTS VISITED BY *Apis mellifera* L. (HYMENOPTERA: APIDAE) IN RECÔNCAVO BAIANO, STATE OF BAHIA, BRAZIL

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ABSTRACT

The objective of this study was to identify the plants visited by *Apis mellifera* L. (Hymenoptera: Apidae) in the region of Recôncavo Baiano, State of Bahia, Brazil. Flowering plants were assessed in a radius of 1.500 m around the apiaries visited. A total of 240 species belonging to 171 genera and 50 families were recorded. The family Leguminosae had the highest species richness (22%), followed by Asteraceae (14%) and Malvaceae (7%) of all plant species visited by *Apis mellifera*. The highest percentage of plants collected had herbaceous growth habit (44%), followed by woody plants (26%) and shrubs (18%). Lianas, vines and palm trees were significantly less represented. It was found that 65% of species had actinomorphic flowers and 33% had zygomorphic flowers. The genera that showed greater diversity were *Sida* with nine species, *Croton* with six species, *Senna* with five species. and while *Chamaecrista*, *Eucalyptus*, *Eupatorium*, *Ocimum*, *Passiflora* and *Vernonia* were represented by four species each. The flora of apicultural interest in the region of Recôncavo Baiano has a wide range of species with varying growth habits.

Keywords: Apicultural flora, bee, pollen, honey

PLANTAS VISITADAS POR *Apis mellifera* L. (HYMENOPTERA: APIDAE) NO RECÔNCAVO BAIANO

RESUMO

O objetivo deste estudo foi identificar as plantas visitadas por *Apis mellifera* L. na região do Recôncavo Baiano. Foi realizado um levantamento das plantas em floração em um raio de 1.500 m dos apiários visitados. Foram registradas 240 espécies, pertencentes a 171 gêneros e 50 famílias. A família Leguminosae apresentou maior riqueza de espécies com 22%, seguida da Asteraceae (14%) e Malvaceae (7%) do total de espécies vistadas por *Apis mellifera*. A maior percentagem de

plantas coletadas apresentou hábito de crescimento herbáceo com 44%, seguido pelas de hábito arbóreo (26%) e arbustivo (18%). As lianas, trepadeiras e palmeiras tiveram menor representatividade. Verificou-se que 65% das espécies apresentaram flores actinomorfas e 33% zigomorfas. Os gêneros que apresentaram maior diversidade foram *Sida* com nove espécies, *Croton* com seis, *Senna* com cinco e *Chamaecrista*, *Eucalyptus*, *Eupatorium*, *Ocimum*, *Passiflora* e *Vernonia* representados por quatro espécies cada. A flora de interesse apícola na região do Recôncavo Baiano apresenta uma grande diversidade de espécies com hábitos de crescimento variado.

Palavras-chave: Flora apícola, abelha, pólen, mel

INTRODUCTION

Insects are important pollinators of angiosperms, and among them, the bees are considered the most efficient ones in almost all ecosystems. Approximately 67% of flowering plants depend on bees for pollination, while these depend directly on collecting pollen and nectar to feed their larvae and adults (VIANA & SILVA, 2006).

Africanized bees feed almost exclusively on pollen and nectar, needing to visit certain amounts of flowers daily. They can better adapt to tropical climates, managing to survive for several months, even when they have to face long periods of drought or rain, very common in these regions (MUNIZ & BRITO, 2007). The environmental value of apiculture is characterized by interdependence with the vegetation, since the visits of bees to flowers of native species ensure agricultural pollination, increasing agricultural productivity and ensuring the perpetuation of native species (NOGUEIRA-NETO, 1998).

Melitophilous plants are those that provide products for bees (TORQUATO, 2006). According to Wiese (1987) the apicultural value of plants is related to the abundance of flowers, the daily volume of nectar secreted, with the concentration of sugars in nectar and low competition for pollinators.

The diversity of the Brazilian flora associated with the territorial extension and the existing climate variability, allows the country a great apicultural potential, with harvests during the entire year, what distinguishes Brazil from other producing countries that normally gather honey only once a year (MARCHINI et al., 2004). Little

is known about the floral resources needed to maintain communities of bees in natural habitats in Brazil (AGUIAR, 2003) and knowledge of plants that are food resources for bees is essential to the establishment of conservation programs for these insects (CARVALHO & MARCHINI, 1999). Through knowledge of plants used by bees in the pasture, beekeepers can handle their apiary in order to get a better use of flowers and thereby optimize their honey production (JONES & BRYANT JR., 1996).

The apicultural activity in Recôncavo Baiano is developed mainly by small and medium-sized farms, becoming an important source of income for many families in rural areas. Despite its importance, there are some limitations that hinder the increase of production honey and other bee products in this region, among which the low information are the regional apicultural flora. Thus, the objective of this study was to identify the plants visited by *Apis mellifera* L. (Hymenoptera: Apidae) in the Recôncavo Baiano region.

MATERIAL AND METHODS

Monthly collections of vegetative and reproductive parts of flowering plants visited by bees within 1.500 m of the apiaries were conduct in the following six municipalities of Recôncavo Baiano: Cachoeira, Castro Alves, Cruz das Almas, Governador Mangabeira, Itatim and São Felix, in the period of March/2009 to February/2010.

The collection and processing of botanical material followed the techniques described by Moreti et al. (1989) and the material collected was deposited in the Herbarium of Recôncavo Baiano (HERB), Federal University of Recôncavo da Bahia. The pollen grains removed from the poliferous material (flower buds) were mounted on slides using the acetolysis method (ERDTMAN, 1960). The taxonomic identification of plant species was based on the available scientific literature and comparison with material deposited in the Herb collection.

The pollen slides were deposited in the pollen reference collection of Apiculture/Meliponiculture plants of the Núcleo de Estudo dos Insetos do Centro de Ciências Agrárias, Ambientais e Biológicas (Experimental Center for the Studies of Insects – Center of Agricultural, Environmental and Biological Sciences)/ Federal University of Recôncavo da Bahia. The characteristics of growth habit and floral

symmetry for each species were recorded according to Ferri (1983) and Bell (1991).

RESULTS AND DISCUSSION

A total of 240 plant species were visited by *Apis mellifera* in the municipalities of Recôncavo Baiano, distributed in 171 genera and 50 families (Table 1). The Leguminosae family had a higher richness of species (52) representing 22% of the total, followed by Asteraceae (14%) and Malvaceae (7%) (Figure 1).

The Asteraceae family stands out in many studies (POTT & POTT,1986; RAMALHO et al., 1990; MARCHINI et al., 2001 and MELO, 2008) as one of the richest in species visited by bees. Locatelli & Machado (2001) suggest that this is probably due to the fact that this family is the largest and of greater geographical distribution one among angiosperms.

Melo (2008) recorded a total of 161 species of plants visited by *A. mellifera*, belonging to 117 genera and 46 families in the region of Mundo Novo, Bahia, and that the families Asteraceae, Leguminosae, Malvaceae, Myrtaceae, Sterculiaceae and Verbenaceae were the richest in species. These families were also more representative in this study (Figure 1).

The Leguminosae family, the most abundant in number of species in the studied region was reported by Viana et al. (2006) as one of the most important in terms of number of apicultural flora in an area of restinga in Bahia, with seven species recorded, indicating a likely apicultural potential for this region. The Leguminosae-Mimosoideae are composed of about 60 genera represented by 3,000 species, distributed mainly in tropical and subtropical regions, plus some species that are found in temperate regions. Its importance as a supplier of food source for bees is well known and is mentioned in several studies (ALMEIDA, 2002; ANDENA et al., 2002; CARVALHO et al., 2006 and NASCIMENTO et al., 2009a).

According to Ramalho et al. (1990) and Carvalho et al. (2001) the families Anacardiaceae, Arecaceae, Asteraceae, Balsaminaceae, Euphorbiaceae, Labiatae, Moraceae, Myrtaceae, Proteaceae, Rubiaceae and Sterculiaceae are important sources for the collection of trophic resources in the neotropical regions both for Africanized bees and stingless bees.

Table 1. List of species of apicultural interest collected at flowering within 1.500 m of apiaries in Recôncavo Baiano: March/2009 to February/2010. Legend: GH = Growth Habit, Herb = herbaceous, Arb = arboreous, Shr = shrubby, Li = Liana, Vine = vine, Pal = palm , FS = Flower Symmetry, Z = zygomorphic, A = actinomorphic, NR = not registered, RE = Resource, N = nectar, P = pollen, CA = Cruz das Almas, CC = Cachoeira, CT = Castro Alves, GM = Governador Mangabeira, IT = Itatim, SAF = São Felix.

Famíly	**Scientific Name**	**Common Name**	**GH**	**FS**	**RAE**	**Place of collection**	**Flowering Period**
Acanthaceae	*Justicia* sp.	-	Shr	Z	P	CA	May to August
	Ruellia paniculata L.	-	Herb	Z	N/P	CT	Jan. and Sep.
Amaranthaceae	*Alternanthera brasiliana* (L.) Kuntze	Penicillin/sodium dipyrones	Herb	Z	N	CA	May
	Alternanthera sp.	-	Shr	Z	N	CA	April; July to Aug.
	Alternanthera tenella Colla	Perpétua do mato/ apaga-fogo	Herb	Z	N	CT	Aug. to Oct.
	Amaranthus spinosus L.	Thorny amaranth	Herb	Z	P	CA	Aug.
Anacardiaceae	*Anacardium occidentale* L.	Cashew	Arb	A	N	CA, CC, GM	Sep.
	Astronium cf. *macrocalyx* Engl.	-	Arb	A	-	CT	Oct. to Dec.
	Astronium sp.	Brazilian pepper	Arb	A	-	CA	March to May; Oct. to Dec.
	Mangifera indica L.	Mango	Arb	A	N	CC, CA, CT, GM	Sep.
	Schinus terebinthifolius Raddi	Brazilian pepper tree	Shr	A	N	CA, CC, GM	Feb. to May
	Spondias tuberosa Arr. Cam.	Umbu/Brazil plum	Arb	A	-	CA	Oct.
	Spondias sp.	Cajarana of the Hinterland	Arb	A	N	CA	Dec.
Apiaceae	*Coriandrum sativum* L.	Coriander	Herb	A	-	CA	Sep. to Dec.
	Pimpinella anisum L.	Anise	Herb	A	-	CA	June to Aug.
Apocynaceae	*Tabernaemontana laeta* Mart.	Jasmine	Arb	A	-	CC	Sep.
	Thevetia thevetioides (Kunth) K. Schum	Giant helvetia	Shr	A	-	CA	Nov.
Arecaceae	*Cocos nucifera* L.	Coconut	Pal	A	N	CA	Oct. to Jan.; April to July
	Elaeis guineensis Jacq.	Oil palm	Pal	A	P	CA	March to April; Sep. to Aug.
	Syagrus coronata Bond.	Licuri palm	Pal	A	N	CA	Oct. to Dec.
Asteraceae	*Acanthospermum australe* (Loefl.) Kuntze.	Paraguay Starbur	Herb	A	-	CA	Aug. to Sep.
	Acanthospermum sp.	Bristly Starbur	Herb	A	-	CA	Aug. to April.
	Ageratum conyzoides L.	Invading Ageratum	Herb	A	N	CA, SAF	Jan. to Dec.
	Ageratum sp.	Whiteweed	Herb	A	-	CC	Oct.
	Aspilia sp.	Daisy; Emilia plant	Herb	A	-	CA	July
	Bidens pilosa L.	Hairy beggarticks	Herb	A	N/P	CC, CA,CT, GM	May. to June
	Bidens sulphurea (Cav.) Sch. Bip.	Sulfur Cosmos; Yellow cosmos	Herb	A	N/P	CA	Jan. to Aug.

(Continue…)

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Famíly	Scientific Name	Common Name	HC	SF	RE	Place of collection	Flowering Period
	Bidens sp.	-	Herb	A	N	CA	Feb. to April; July to Sep.
Asteraceae	*Blainvillea biaristata* DC.	-	Herb	A	-	CA	Aug.
	Blainvillea rhomboidea Cass.	Erva-palha	Herb	A	-	CA	April to June
	CentratHerbum punctatum Cass.	Brazilian button flower	Herb	A	N	CC, CA, CT, GM	May to Aug.
	Conyza canadensis (L.) Cronquist.	Canadian horseweed	Herb	A	-	CA	March to June
	Eclipta alba (L.) Hassk.	Elephant's foot	Herb	A	-	CA	Aug.
	Emilia sonchifolia (L.) DC.	Lilac tassel-flower	Herb	A	-	CA	May to Aug.
	Erechtites hieraciifolius (L.) Raf. Ex DC.	Fireweed	NR	A	-	CA	Feb. to April; Sep. to Nov.
	Erechtites sp.	Redflower ragleaf	Herb	A	N	CA	July
	Eupatorium maximilianii Schrad.	-	Herb	A	-	CA	Aug.
	Eupatorium sp.1	-	Herb	A	-	CA	Aug.
	Eupatorium sp.2	False nettle	Herb	A	-	CC	Sep.
	Eupatorium sp.3	Little Joe	Herb	A		CC	Oct.
	Galinsoga parviflora Cav.	Small-flower galinsoga	Herb	A	P	CA	May to July
	Helianthus annuus L.	New sunflower	Herb	A	N/P	CA	Aug. to Jan.
	Melampodium paniculatum Gardner	Butter daisy	Herb	A	-	CA	Aug. to Sep.
	Melampodium sp.1	-	Herb	A	-	CA	Aug.
	Melampodium sp.2	-	Herb	A	-	CC	Sep.
	Montanoa pyramidata Sch.Bip.	Margarida-branca	Shr	A	-	CA	July to Oct.
	Piptocarpha sp.	Ash daisy	Arb	A	-	CT	Dec.
	Pluchea sagittalis (Lam.)	-	Herb	A	-	CA	Oct.
	Rudbeckia laciniata L.	Cutleaf coneflower	Herb	A	-	CA	Oct. to Jan.
	Sonchus oleraceus L.	-	Herb	A	-	CA	July
	Vernonia condensata Baker.	Boldus	Shr	A	N	CA	June to Nov.
	Vernonia sp.1	Bitterleaf	Shr	A	N	CA	Oct.to March
	Vernonia sp.2	Bitterleaf	Shr	A	N	CA	Oct. to March
	Vernonia sp.3	-	Herb	A	N	CA	Aug.
Bignoniaceae	*Jacaranda* sp.	Brazilian rose wood	Arb	Z	-	CC	Oct.
	Spathodea campanulata P. Beauv.	African Tuliptree	Arb	Z	P	CA, CC	Aug. to Nov.
	Stenolobium stans (L.) Seem.	Yellow trumpetbush	Arb	Z	-	CA	Jan. to Dec.

(Continue…)

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Family	Scientific Name	Common Name	HC	FS	RE	Place of collection	Flowering Period
	Tabebuia sp.	Brazilian walnut	Arb	Z	P	CA	May to Oct.
Bignoniaceae	*Tecoma heptaphylla* (Vell.) Mart.	Pink tecoma	Arb	Z	N	IT	May to July
Bixaceae	*Bixa orellana* L.	Annato	Arb	A	P	CA	Sep. to Nov.
Bombacaceae	*Pachira aquatica* Aubl.	Guaianan chestnut	Shr	A	-	CA	Dec.
Boraginaceae	*Cordia superba* Cham.	Baba-de-boi	Shr	A	-	CA; CT	Jan.
	Cordia verbenacea DC.	Forget-me-not	Shr	A	-	CA	Sep.
	Heliotropium angiospermum Murray	Scorpion's tail	Herb	A	N	CC, CA, CT, GM	March to June; Aug. to Oct.
	Heliotropium sp.	Heliotrope	Herb	A	N	CC, CA,	Aug.
Capparaceae	*Crataeva tapia* L.	Tapia	Arb	Z	-	CT	Jan.; Nov.
Caprifoliaceae	*Sambucus australis* Cham & Schlecht.	Black elder	Shr	A	P	CA	Sep. to April
Chrysobalanaceae	*Licania tomentosa* Benth.	Oiti tree	Arb	Z	-	CA	Oct. to Nov.
Combretaceae	*Terminalia catappa* L.	Bengal Almond	Arb	A	-	CA	Sep.
Commelinaceae	*Commelina benghalensis* L.	Bengal dayflower	Herb	Z	-	CA; CT	March to June; Aug. to Nov.
Convolvulaceae	*Ipomoea bahiensis* Willd.	-	Ter	Z	N	CA	Jan. to Dec.
	Ipomoea carnea Jacq. subsp. *fistulosa* Mart. ex Choisy	Morning Glory bush	Shr	Z	N	CA	Jan. to Dec.
	Ipomoea sp.	Beach Morning Glory/Goat's foot	Li	Z	N	CC, CA, GM	Jan. to Dec.
	Merremia aegyptia (L.) Urb.	-	NR	NR	-	GM	Oct.
	Merremia sp.	-	NR	NR	-	CA	Aug.
Crassulaceae	*Bryophyllum pinnatum* (Lam.) Oken.	Horse chestnut	Herb	Z	-	CA	July to Dec.
Cucurbitaceae	*Cayaponia tayuya* (Vell.) Cogn.	Tayuya	Li	A	N	CA	Aug.
	Momordica charantia L.	Balsam pear	Li	A	N	CA; CT	July to Dec.
	Sechium edule Swartz.	Chayote	Li	A	N	CA	March to July
Euphorbiaceae	*Croton campestris* St. Hill.	Bellyache bush	Shr	A	N	CA; CT	Jan. to Feb.; May
	Croton moritibensis Baill.	Croton	Shr	A	N	CA; CT	Aug. to Dec.
	Croton lobatus L.	Croton	Herb	A	N	CA	May to Sep.
	Croton sp.1	-	Herb	A	N	CA	May to Sep.
	Croton sp.2	Croton	Herb	A	N/P	CA	March to June
	Croton sp.3	Croton	NR	A	-	CA	Oct to Jan.
	Euphorbia hyssopifolia L.	Garden spurge	Herb	A	-	CA	April to July
	Euphorbia milii L.	Coroa-de-cristo	Shr	A	-	CA	May to Sep.

(Continue…)

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Family	Scientific Name	Common Name	HC	FS	RE	Place of collection	Flowering Period
Euphorbiaceae	*Jatropha molissima* (Pohl) Baill.	Black vomit nut	Shr	A	-	CT	March
	Manihot esculenta Crantz.	Brazilian arrowroot	Shr	A	N	CA	Aug.
	Ricinus communis L.	Castor bean	Shr	A	N/P	CA	Aug. to Dec.
Lamiaceae	*Hyptis multiflora* Pohl.	Bishop's wort	Herb	Z	N	CA	May to July
	Ocimum basilicum L.	Common Basil	Herb	Z	N	CA	Aug. to Dec.
	Ocimum canum Sims.	Sweet basil	Herb	Z	N	CT	May to June
	Ocimum gratissimum L.	Basil	Shr	Z	N	CA	Nov.
	Ocimum sp.	-	Herb	Z	N	CA	March to April
	Salvia sp.1	-	Herb	Z	N	CA	July to Sep.
	Salvia sp.2	Salvia	Herb	Z	N	CA	May. to April
Lauraceae	*Persea americana* Mill.	Avocado pear	Arb	A	-	CA	Sep
Leguminosae-Caesalpinioideae	*Bauhinia fortificta* Link.	Brazilian orchid tree	Arb	Z	P	CA	March to June; Sep. to Feb.
	Caesalpinia ferrea Mart.	Brazilian Iron wood	Arb	Z	N	IT	Jan. to March
	Caesalpinia peltophoroides Benth.	Sibipiruna	Arb	Z	P	CA	Jan. to March
	Caesalpinia pyramidalis Tul.	Lobelia wall	Arb	Z	P	CT	Jan. to April
	Copaifera langsdorffii Desf.	Jesuit's Balsam	Arb	Z	P	CT	Jan. to Feb.
	Delonix regia Raff.	Flamboyant	Arb	Z	P	CA	Nov. to Jan.
	Poeppigia procera C. Presl.	-	Arb	Z	N	IT	Aug. to Oct.
	Senna macranthera (Collad.) H.S.Irwin & Barneby	Java bean	Arb	Z	P	CC, CA, CT	Jan. to Feb.; May; July to Aug.
	Senna obtusifolia L.	Java bean	Shr	Z	P	CC, CA, GM	Aug. to Dec.
	Senna occidentalis L.	Stinking weed	Shr	Z	P	CC, CA, GM	March to April
	Senna spectabilis DC.	Bougainvillea Willd	Arb	Z	P	IT	Dec. to April
	Senna sp.	Cassia flowers	Shr	Z	P	CA	March to May; Oct. to Dec.
	Tamarindus indica L.	Tamarindo	Arb	Z	P	CC, CA, GM	Nov. to Jan.
Leguminosae-Faboideae	*Bowdichia virgilioides* Kunth.	Sucupira	Arb	Z	P	CA; CT	Nov.
	Cajanus cajans L.	Hybanthus	Herb	Z	P	CA	Sep. to Feb.
	Calliandra surinamensis Benth.	-	Arb	Z	-	CC	Sep.
	Canavalia ensiformis DC.	Jack bean	Herb	Z	-	CA	Sep. to Nov.
	Canavalia sp.	Candida	Herb	Z	-	CC	Sep.
	Chaetocalyx scandens L.	-	Ter	Z	N	IT	-

(Continue…)

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Family	Scientific Name	Common Name	HC	FS	RE	Place of collection	Flowering Period
Leguminosae-Faboideae	*Chamaecrista belemii* (H.S.Irwin & Barneby) H.S.Irwin & Barneby	-	Herb	Z	P	IT	-
	Chamaecrista flexuosa (L.) Greene	-	Herb	Z	P	CA	May to July
	Chamaecrista rotundifolia (Pers.) Greene	-	Herb	Z	P	CA	May to July
	Chamaecrista sp.	-	Herb	Z	P	CA	Aug. to Dec.
	Clitoria fairchildiana Howard.	Sombrero	Arb	Z	P	CA	Nov.
	Crotalaria incana L.	Rattlepod	Herb	Z	P	CA, GM	Feb. to May
	Desmodium adscendens (Sw.) DC.	Desmodium	Herb	Z	P	CC, CA, GM	Aug. to Jan.
	Desmodium sp.	Desmodium	Herb	Z	-	CA	March to Nov.
	Desmodium triflorum (L.) DC.	Desmodium	Herb	Z	P	CT	Jan.; April; July
	Erythrina velutina Willd.	Woodson	Arb	Z	P	CT	Nov. to Dec.
	Gliricidia sepium Jacq.	Quick-stick	Arb	Z	N	CA	Aug. to Sep.
	Indigofera hirsuta L.	Hairy indigo	Herb	Z	P	CA	May to July
	Lablab purpureus (L.) Sweet.	Hyacinth bean	Herb	Z	P	CA	Aug.
	Lonchocarpus cultratus (Vell.) A.M.G. Azevedo & H.C. Lima	Lonchocarpus	Arb	Z	P	CT	Jan.; Nov. to Dec.
	Macroptilium sp.1	Willow	Li	Z	P	CA	Aug. to Nov.
	Macroptilium sp.2	-	Herb	Z	P	CA	May to July
	Peltophorum dubium (Spreng) Taub.	Snake cactus	Arb	Z	P	CA	Nov.
	Phaseolus vulgaris L.	Phellodendron	Herb	Z	-	CA	April to May; Sep. to Oct.
	Stylosanthes viscosa Sw.	Poor man's friend	Herb	Z	P	CA	Aug.
	Vigna unguiculata (L.) Walp.	Cylindrica	Herb	Z	P	CA	July
	Zornia diphylla Pers.	-	Herb	Z	P	CA	May to Sep.
Leguminosae-Mimosoideae	*Acacia bahiensis* Benth.	Cat's claw	Shr	A	-	CT	Jan. to Feb.
	Acacia langsdorfii Benth.	Cat's claw	Shr	A	-	CT	Jan.; Sep. to Oct.
	Acacia sp.	Calumbi	Arb	A	N/P	CA	Feb.
	Albizia polycephala (Benth.) Killip	Angico-branco	Arb	A	-	CT	Dec.
	AnadenantHerba colubrina (Vell.) Brenan	Angico	Arb	A	-	CA; CT	Jan.
	Inga bahiensis Benth.	Ingá	Arb	A	-	CA; CT	Nov.
	Inga edulis Mart.	Ingá-cipó	Arb	A	-	CA	Aug. to Dec.
	Leucaena leucocephala Lam.	Leucena	Arb	A	N/P	CA	Sep. to Dec.
	Mimosa arenosa (Willd.) Poir.	Jurema	Arb	A	N/P	CC, CA; CT	Aug. to Oct.

(Continue…)

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Family	Scientific Name	Common Name	HC	FS	RE	Place of Collection	Flowering Period
Leguminosae-Mimosoideae	*Mimosa caesalpiniaefolia* Benth.	Thrus	Arb	A	-	CC, CA	June to Sep.
	Mimosa pudica L.	Malícia	Herb	A	N/P	CC, CA	April to July and Aug. to Nov.
	Prosopis juliflora DC.	Mesquite	Arb	A	-	CA; CT	Oct. to Dec.
Liliaceae	*Bulbine frutescens* L.	Snake flower	Herb	A	-	CA	May to Aug.
Loranthaceae	*Struthanthus* sp.	Mistletoe	Li	A	-	CA	Sep. to Nov.
Lythraceae	*Cuphea racemosa* (L.f.) Spreng.	-	Herb	Z	-	CT	April to June
Malpighiaceae	*Byrsonima* sp.	Golden spoon	Shr	Z	-	CA	Dec.
	Malphigia emarginata DC.	Acerola	Shr	Z	-	CA	Sep .to Nov.
	Stigmaphyllon auriculatum (Cav.) Adr. Juss.	-	Ter	Z	P	IT	Dec. to Feb.
Malvaceae	*Gossypium hirsutum* L.	Cotton	Herb	A	P	CA	Oct. to Jan.
	Herissantia crispa (L.) Fryxell	Bladdermallow	Herb	A	-	CT	March; June; Aug. to Oct.
	Hibiscus esculentus L.	Ókra	Herb	A	P	CA	Dec. to Feb.
	Hibiscus rosa-sinensis L.	Graxa	Shr	A	N/P	CA, CC	Jan. to Dec.
	Hibiscus sp.	Hibiscus	Shr	A	P	CA	April to Aug.
	Malvastrum tomentosum (L.) S.R. Hill	-	Herb	A	-	CT	Aug.
	Pavonia cancellata Cav.	Arrow leaf sida	Herb	A	-	CA	Jan. to Dec.
	Sida cordifolia L.	Arrow leaf sida	Herb	A	P	CA	Jan. to Dec.
	Sida linifolia Juss ex Card.	Arrow leaf sida	Herb	A	P	CA	Aug. to Dec.
	Sida paniculata L.	Arrow leaf sida	Herb	A	P	CT	Jan.; Aug. to Sep.
	Sida rhombifolia L.	Arrow leaf sida	Herb	A	P	CA	March to June
	Sida spinosa L.	Ivy-leaf Sida	Herb	A	P	CA	July to Aug.; Oct. to Nov.
	Sida sp.1	Ivy-leaf Sida	Herb	A	P	CA	Aug. to Dec.
	Sida sp.2	Ivy-leaf Sida	Herb	A	P	CA	Aug. to Dec.
	Sida sp.3	Malv Ivy-leaf Sida	Herb	A	P	CA	March to May and Aug. to Nov.
	Sida sp.4	Ivy-leaf Sida	Herb	A	-	CA	Jan. to Dec.
	Urena lobata L.	Urens	Herb	A	-	CA	April to May; Aug.; Nov.
Meliaceae	*Trichilia hirta* L.	Erytroxilum	Arb	A	-	CT	Jan.
Molluginaceae	*Mollugo verticillata* L.	-	Herb	A	-	CA	May
Moringaceae	*Moringa oleifera* Lam.	Horseradish tree	Shr	A	N/P	CA	Jan. a dez.
Myrtaceae	*Eucalyptus* sp.1	Eucalyptus	Arb	A	N/P	CA	Nov. to Dec.; Jan. to March
	Eucalyptus sp.2	Eucalyptus	Arb	A	N/P	CA	Nov. to Dec.; Jan.to March

(Continue…)

Table 1. Continue…List of species of apicultural interest collected at flowering within 1.500 m of apiaries in Recôncavo Baiano: March/2009 to February/2010.

Family	Scientific Name	Common Name	HC	FS	RE	Place of collection	Flowering Period
Myrtaceae	*Eucalyptus* sp.3	Eucalyptus	Arb	A	N/P	CA	Nov. to Dec.; Jan. to March
	Eucalyptus torelliana F.Muell.	Eucalyptus	Arb	A	N/P	CA	Nov. to Dec.; Jan. toMarch
	Eugenia uniflora L.	Brazilian cherry	Arb	A	P	CA	Aug. to Oct.
	Myrciaria cauliflora Berg.	Brazilian grape tree	Shr	A	-	CA	Sep. to Nov.
	Psidium araça Raddi.	Arnica	Shr	A	N/P	CA	March to April
	Psidium guajava L.	Guave	Arb	A	-	CA	Sep.
	Syzygium cumini (L.) Skeels	Cumini	Arb	A	-	CA	Jan. to Feb.
	Syzygium malaccensis L.	Malay apple	Arb	A	N/P	CA	Nov. to Dec.
Onagraceae	*Ludwigia* sp.	-	Herb	A	N	CA	April to May; Dec. to Jan.
Oxalidaceae	*Averrhoa carambola* L.	Star fruit	Arb	A	-	CA	Nov.
Oxalidaceae	*Oxalis psoraleoides* H.B.K.	-	Shr	A	-	CT	Jan. to Feb.; May
Papaveraceae	*Argemone mexicana* L.	Prickly poppy	Herb	A	-	CA	Aug.
Passifloraceae	*Passiflora edulis* L.	Passion fruit	Ter	A	-	CA	Oct.
	Passiflora foetida L.	Passion fruit	Ter	A	N	IT	Oct.
	Passiflora macrocarpa Mart.	Passion fruit	Ter	A	-	CA	Nov.
	Passiflora violacea Vell.	Passion fruit vine	Ter	A	N	IT	Oct.
Poaceae	*Sorghum bicolor* L.	Great millet	Herb	NR	P	CA	Oct.
	Zea mays L.	Corn	Herb	NR	P	CC, CA, GM	Aug.
Polygonaceae	*Antigonon leptopus* Hook.	Coral creeper	Ter	A	-	CA	Jan. to Dec.
	Coccoloba paniculata Meisn.	Arborecens	Shr	A	-	CC	Sep.
	Ruprechtia laxiflora Meisn.	-	Arb	A	-	CT	Dec.; Jan. to Feb.
Portulacaceae	*Portulaca elatior* Mart.	-	Herb	A	-	CT	Jan. to June.; Aug. to Oct.
	Portulaca oleracea L.	Garden purslane	Herb	A	P	CC, CA, GM	Sep to Nov. and March to June
	Portulaca sp.	-	Herb	A	N	CA	Marc to June
	Talinum patens Will.	Gaertner	Herb	A	-	CC, CA; CT	March to May and Aug. to Nov
Rhamnaceae	*Ziziphus joazeiro* Mart.	Ziziphus jujuba Miller	Arb	A	N	CT	Dec.; Jan.to Feb.
Rubiaceae	*Borreria suaveolens* G. Mey	Suaveolens Var	Herb	A	N	CA	May to Oct.
	Borreria verticillata (L.) G. Mey.	Ambrosioides	Herb	A	N/P	CA, CC, SAF, GM	May to Aug.
	Borreria sp.	-	Herb	A	N/P	CA	May
	Emmeorhiza umbellata (Spreng.) K. Schum.	-	Li	A	-	CC	Sep.
	Genipa americana L.	Genipa tree	Arb	A	N	CA	March to May

(Continue…)

Table 1. Continue…List of species of apicultural interest collected at flowering within 1.500 m of apiaries in Recôncavo Baiano: March/2009 to February/2010.

Family	Scientific Name	Common Name	HC	FS	RE	Place of collection	Flowering Period
Rubiaceae	*Machonia spinosa* Mart.	-	NR	A	N	CT	March
	Richardia grandiflora (Cham. & Schltdl.)	Ervanço	Herb	A	N	CA	May to Aug.
	Richardia sp.	-	Herb	A	N	CA	Jan. to Dec.
Rutaceae	*Citrus latifolia* Tan.	Lemon/Tahiti lime	Shr	A	N	CA	March to April; Aug to Oct.
	Citrus limonia Osbeck	Rangpur Lime	Arb	A	N	CA	Sep.
	Citrus sinensis (L.) Osbeck	Orange tree	Shr	A	N	CA,CC, GM	March to April.; Aug. to Oct.
Sapindaceae	*Cardiospermum corindum* L.	Baloon vine	Li	A	N	CA; CT; IT	July to Sep.
	Serjania pernambucensis Radlk.	Cipo-uva	Ter	A	N	CA	July to Sep.
Sapotaceae	*Bumelia sartorum* Mart.	Quixabeira	Arb	A	N	CT	Sep.
	Manilkara acharas Mill (Flosberg) L.	Sapodilla tree	Arb	A	N	CA	Aug. to Oct.
Scrophulariaceae	*Scoparia dulcis* L.	Sweet broom	Herb	Z	N/P	CA	Aug. to Sep.; March to June
Solanaceae	*Cestrum laevigatum* Schltdl.	Quarana	Shr	A	P	CA	Nov.
	Nicotiana tabacum L.	Tobacco	Herb	A	P	CA	Aug. to Nov.
	Physalis pubescens L.	Downy ground-cherry	Herb	A	P	CA	Aug.
	Physalis sp.	-	Herb	A	P	CA	July
	Solanum americanum Mill.	American Black Nightshade	Herb	A	P	CA	July
Sterculiaceae	*Melochia tomentosa* L.	-	Shr	A	N	CT; IT	Jan. to June; Aug. to Dec.
	Waltheria indica L.	-	Herb	A	N	CT	Aug.
	Waltheria sp.	-	Herb	A	N	CA	Nov. to Feb.
Turneraceae	*Piriqueta racemosa* (Jacq.) Swert	-	Herb	A	-	CT	Aug.; Oct.
	Turnera ulmifolia L.	-	Herb	A		CA	Aug. to Sep.; Jan.
	Turnera sp.	-	Herb	A	N/P	CT	Aug. to Sep.; Jan.
Verbenaceae	*Aloysia gratissima* (Gillies & Hook.) Tronc.	White bush	Shr	Z	N	CA	Aug. to Jan.
	Aloysia virgata (Ruiz & Pav.) Juss.	Pippia	Arb	Z	N	CA	Oct. to Nov.
	Duranta repens L.	Pingo-de-ouro	Shr	Z	-	CA, GM	May to July
	Gmelina sp.	Teca	Arb	Z	-	CA	March
	Lantana camara L.	Wild sage	Shr	Z	N	CA	Jan. to Dec.
	Lippia alba N.E. Brown.	Lemongrass	Shr	Z	N	CA; CT	Aug. to Jan.
	Lippia sp.	Lippia	NR	Z	N	CA	-
Verbenaceae	*Priva bahiensis* DC.	-	Herb	Z	-	SAF	-
Vitaceae	*Cissus simsiana* Roem. & Schult.	Cissus	Li	A	N	CT	Jan. to Feb.

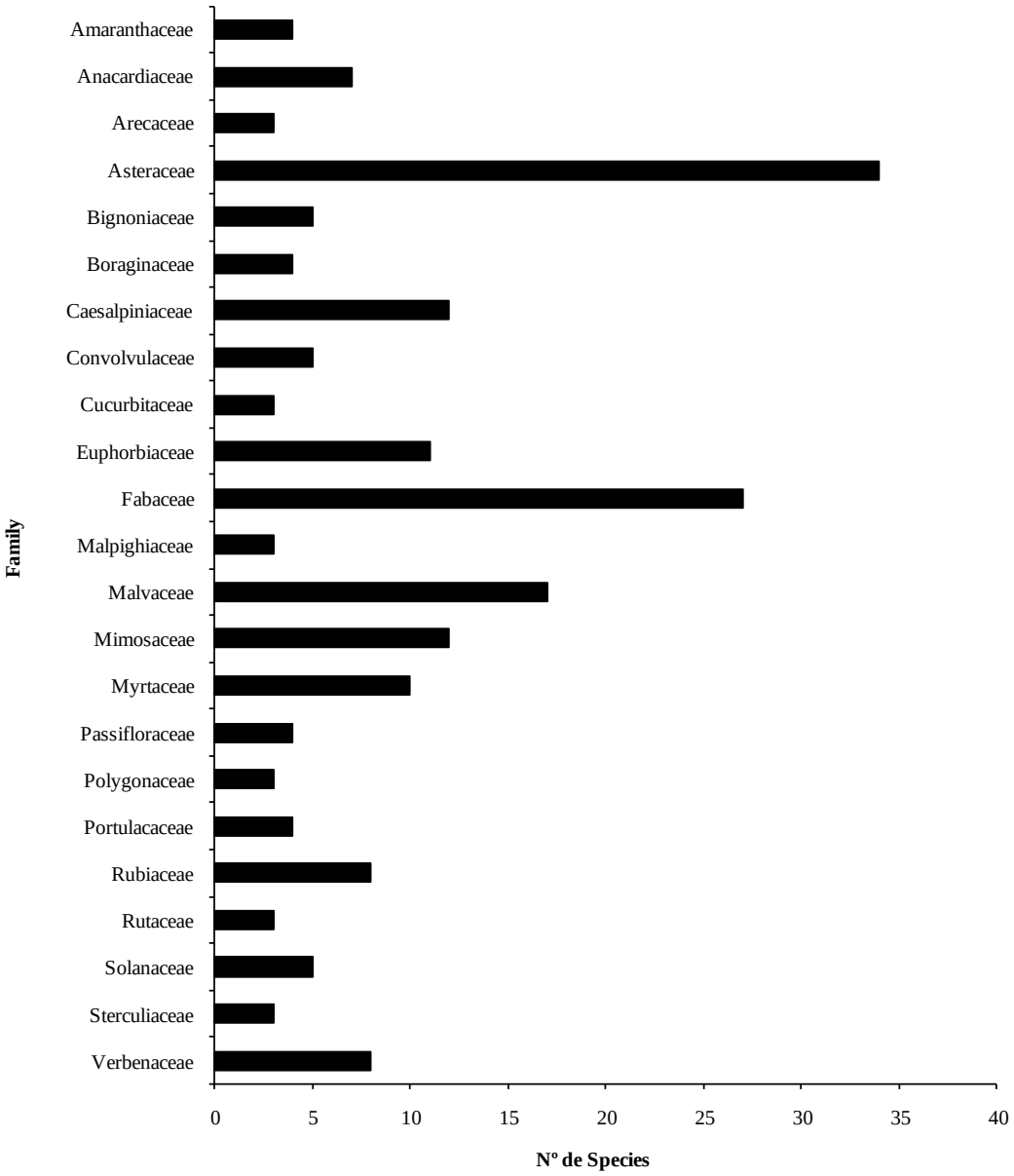

Figure 1. Main families in number of species of apicultural interest collected at flowering plants within 1.500 m of apiaries in Recôncavo Baiano: March/2009 to February/2010.

Aguiar et al. (1995) when evaluating the floral resources used by bees in the caatinga area found that the families Boraginaceae, Convolvulaceae, Cactaceae, Sterculiaceae and Caesalpiniaceae represent the largest source of pollen and nectar in the area. According to these authors the floral resources are related to seasonal variation and the flowering pattern of plants exerts a strong influence on the community structure of bees.

For the Myrtaceae family, pollen is the main resource offered to the pollinators, being the primary resource through which the bees, probably the most important group of pollinators of this family, visit the flowers (NIC LUGHADHA & PROENÇA, 1996).

There are very few evidence of nectar production observed in *Myrciaria dubia* (PETERS & VASQUEZ (1986, 1987), MAUÉS & COUTURIER (2002), *Psidium guajava* and *Eugenia* spp. (RAMALHO et al., 1990), *Myrciaria cauliflora* (MALERBO et al., 1991) and *Plinia glomerata* (PIRANI & CORTOPASSI-LAURINO, 1993). This family was represented by 10 species in this study with emphasis on the *Eucalyptus* genus with 4 species (Table 1 and Figure 1). Some *Eucalyptus* species are cited by Nougueira-Neto (1953, 2009) as species producing good quality honey.

Among the plants of the family Verbenaceae, *Aloysia virgata* is considered by Brandão et al. (2002) as a species of great importance to apiculture. It is found in Bahia, Mato Grosso do Sul and in the Southeast (LORENZ, 2002). This species, which was collected in the city of Cruz das Almas, Bahia, can be used by beekeepers in the area around the apiary to produce honey.

The genera with the highest diversity were *Sida* with 9 species, *Croton* (6), *Senna* (5) and *Chamaecrista*, *Eucalyptus, Eupatorium, Ocimum, Passiflora* and *Vernonia* with four species each (Table 1).

From the species collected in this study, 64 were already registered as constituents of apicultural flora in different localities of Bahia in studies conducted by Moreti et al. (2000); Sodre et al. (2001); Costa (2002); Almeida et al. (2006); Melo (2008); Novais et al. (2009) and Oliveira et al. (2010).

The highest percentage of plants that were identified had an herbaceous growth habit (44%), followed by a woody habit (26%) and shrubs (18%). Lianas (4%), vines (4%) and palms (1%) were significantly less represented. Most of the bees visiting the flowers of herbaceous plants can be associated to the abundance of these plants in the region, the flowering period with a higher concentration of species between March and June during the rainy season in the region (Table 1), the shape and color of flowers (more attractive to bees) and even the concentration of nectar and pollen quantity offered by them. According to Oliveira et al. (2009) bees show a preference for woody plants in general and the resources to be used by the bees depend on their availability in the collection area. Rain promotes diversification of resources due to the low flowering.

Alves (2008), working with the characterization of apicultural flora of the upper Rio Paraná, found that the growth habit of the species was varied and reasonably well distributed, and the tree species and shrubs both represented 19.70% of the plants collected and the other subshrubs 26.52%, 12.88%

herbaceous and 21.21% vines; results somewhat no similar to those found in this study.

It was found that 65% of species had actinomorphic flowers and 33% zygomorphic flowers, while 2% of the species did not have their floral symmetry determined during the period to data collecting. Alves (2008) reported in his study that the most common pattern in relation to floral symmetry was actinomorphic flowers arranged in inflorescences and with a light color corollas. *Apis mellifera* prefer actinomorphic flowers (DAFNI, 1992).

Some fruit species (8%) of apicultural interest to the region were observed, such as *Anacardium occidentale* L., *Byrsonima* sp., *Citrus latifolia* Tan., *C. limon*ia Osbeck, *C. sinensis* (L.) Osbeck, *Eugenia uniflora* L., *Malphigia emarginata*, *Mangifera indica* L., *Manilkara acharas* Mill (Flosberg) L., *Myrciaria cauliflora* Berg., *Passiflora edulis*, *P. foetida* L., *P. macrocarpa* Mart., *Persea americana* Mill., *Psidium araca* Raddi., *P. guajava* L., *Spondias tuberosa* Arr. Cam., *Spondias* sp., *Syzygium cumini* (L.) Skeels and *Tamarindus indica* L. (Table 1). In addition to using cultivated native fruit plants, many bees also visit flowers of ornamental plants, like *Thunbergia grandiflora* Roxb., *Asystasia gangetica* (L.) T. Anderson and *Tecoma stans* (L.) Kunth (MILET-PINHEIRO & SCHLINDWEIN, 2008).

According to Santos et al. (2006) among the species preferentially visited by *Apis mellifera* in Petrolina, State of Pernambuco, the herbaceous species, such as *Borreria verticillata* (L.) G. Mey., *Diodia teres* Walter., *Waltheria rotundifolia* Schrank, *Merremia aegyptia* L., *Jacquemontia confusa* Meisn., and *Hypenia salzmanni* Benth stood out as excellent suppliers of nectar during the rainy season. Some of these species appear in the list of plants collected in this study and the species *Borreria verticillata* is among the pollen types identified in honeys and the mass of pollen collected by Africanized honeybees in Bahia (COSTA, 2002; NASCIMENTO et al., 2009b).

Carvalho & Marchini (1999), in a study on plants visited by *Apis mellifera* in Castro Alves, Bahia, also found the occurrence of several herbaceous species such as *Commelina benghalensis* L., *Croton campestris* St. Hil., *Centratherum punctatum* Cass., *Momordica charantia* L., *Sida paniculata* L., *Portulaca* spp. and *Waltheria indica* L., and although they bloom during the rainy season and despite being considered weeds to crops, they present an apicultural potential. These species were also collected in the region studied and the

record of flowering ones (Table 1) corroborates with those of the authors.

CONCLUSION

Flora visited by *Apis mellifera* L. in the Recôncavo Baiano region has a high diversity of species, especially from the family Leguminosae.

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