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Diversity of honey plants in the Sudanian zone: Case of the Ferme des Trois Lacs in the Department of Dabakala (Center-North, Côte d'Ivoire)

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Abstract

Honey plants are plants that produce a good amount of nectar and pollen that can be collected by bees to make honey. In the north of Côte d'Ivoire, beekeeping is an income-generating activity subject to climatic hazards. It is therefore necessary to study honey plants in the north of Côte d'Ivoire, which is an area of high honey production. The present study was carried out in the Ferme des Trois Lacs in the Department of Dabakala. The farm is one of the largest beekeeping farms in the North and the largest in the region. The study contributes to the knowledge of the honey plants of the Côte d'Ivoire and makes it possible to popularize beekeeping in the region. A total of 72 species of honey plants have been identified. They are divided into 66 genera and 29 botanical families. The richest family in species is the Fabaceae. These are more than half (55.5%) of the transition zone plants. The microphanerophyts are the most represented with 40.27%. The flora is dominated by shrubs at 33.72%. These plants mostly flower during the rainy seasons. Most are visited by bees for nectar. And finally, these plants are mostly spontaneous.

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Introduction

Beekeeping is the rearing of honey bees for the production of honey (Comlan *et al.,* 2017). It is an activity of major economic and environmental importance (Balagueman *et al.,* 2017). Indeed, it limits deforestation and constitutes an alternative for maintaining biodiversity, it also represents a significant source of income for rural populations through the honey trade (Bradbear, 2010).

According to Nombré (2003), the first criterion for evaluating the honey potential of an area is the presence of honey plants. Indeed, the development of beekeeping depends on the climate and on the honey plants from which the bees take nutrients such as nectar, honeydew and pollen which constitute the three essential foods of the colony (Djebbar and Ounadi, 2017), to survive to feed and to elaborate the various products of the hive (honey, wax, pollen, etc.). Bees, by taking nutrients, promote the sexual reproduction of the plants they visit, through pollination for which they contribute 80% (Kabika *et al.,* 2015). The symbiosis between plants and bees is of paramount importance because it allows the maintenance of biodiversity.

The flowers foraged by bees belong to the so-called honey plants (Dongock *et al.,* 2008). These are important in the production of honey. Several authors in West Africa have conducted studies in this direction. This is evidenced by work on knowledge of the honey flora: in Burkina Faso (Sawadogo, 1993 ; Bradbear, 2010), in Benin (Tossou *et al.,* 2005 ; (Yédomonhan *et al.,* 2009) and in Togo (Téou, 2013).

In Côte d'Ivoire, the inventory of honey plants was carried out by Iritié *et al.* (2014) in Yamoussoukro, by Coulibaly *et al.* (2019) to Dimbokro, by Coulibaly *et al.* (2019) in Katiola, by Kouamé *et al.* (2020) in Agboville and by Assi-Kaudjhis *et al.* (2020) in Toumodi.

The northern region of Côte d'Ivoire is the most important area in terms of honey production. To date, only the honey flora of Katiola has been inventoried. The Ferme des Trois Lacs located in Dabakala is one of the large beekeeping farms in the north. However, no scientific data relate to the honey potential of the department. The objective of this study is to provide scientific data on the honey potential of the Department of Dabakala, through the inventory and identification of the honey plants of the Ferme des Trois Lacs allowing a better beekeeping orientation.

Materials and methods

Location of the study site

The Ferme des Trois Lacs is located in the Dabakala department, in the Centre-North of the Côte d'Ivoire in the Hambol region (Fig. 1.). It is 21km from the city of Dabakala on the Santama -Sokoro axis. Its geographic coordinates are: 8° 11'40. 1"N and 4° 24 '47. 8' 'W. Its vegetation is a succession of woodland, teck grove (*Tectona grandis* plantation), fallows and wooded and grassy savannas. The farm has three large landscaped lakes which irrigate the area during the rainy seasons and which are watering places for cattle (oxen, sheep and horses) and wild animals.

The estate owes its name to these three emblematic lakes. The soil of the Dabakala department is of the argilo-ferralitic type (Kouassi *et al.,* 2019). The region's climate is Sudanese with an average annual rainfall of 964.8 mm and an average annual temperature of 26.3°C). The ombrothermal diagram of the area is an alternation of 4 seasons: two rainy seasons (March-June; August-October) and two dry seasons (November-February; the month of August) (Fig. 2.). The population of the department is estimated at 189,254 inhabitants (INS, 2014).

These are the Djimini natives, non-natives from other regions of Côte d'Ivoire: Sénoufo, Koulango, Baoulé, Bété, Agni, etc. and non-natives from the countries of the West African sub-region: Mali, Burkina Faso, Senegal, Guinea and. The main activity practiced by this population is agriculture then trade. According to INS (2014), agriculture contributes 80% of the economy of the Department.

Collection of data

Data collection consisted of an 'inventory of honey plants was carried out within a radius of 1 km around the apiary (Yédomonhan *et al.,* 2009; Assi-Kaudjhis *et al.,* 2020; Kouamé *et al.,* 2020).

Surface and roving forest inventory methods have been adopted. The surface surveys consisted of laying rectangular plots with an area of 500m² (25m × 20m), considering the four cardinal points from north to south; from east to west (Fig. 2.). The traveling surveys made it possible to complete the list of honey plants by traversing the spaces between the plots and the parts not inventoried in the observation radius. Observations were made with the naked eye and with a microscope if necessary.

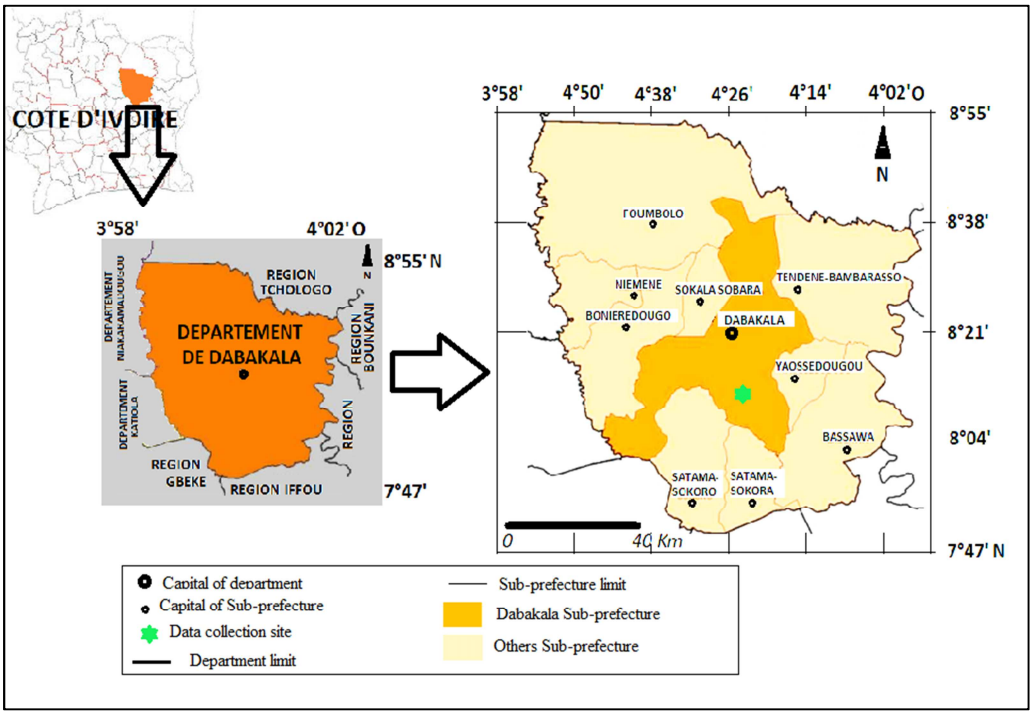

Fig. 1. Loalisation of the three lakes farm in the Dabakala Department.

Honey plants are plant species whose flowers are visited by honey bees for a period of at least 3 minutes (Iritié *et al.,* 2014; Kouamé *et al.,* 2020). These are the nectar-bearing plants whose base of the flower corollas is visited by bees; pollinating plants are those whose flowers are visited by bees and whose pollen balls are visible on the bees' hind legs at the level of the pollen baskets; nectaro-pollinating plants are the species whose base of flower corollas is visited by bees and whose pollen can be observed on the pair of hind legs at the level of the pollen baskets. The identification of the plants was done in the field (in situ) and in the laboratory. The twigs of little-known plants made up of stems, leaves, flowers or fruits were collected in a herbarium for their identification in the laboratory. The names of honey plants are updated from the work of Lebrun and Stork (1992) and APG IV (2016).

The biological types (Megaphanerophyts; MP), Mesophanerophyts; mP), Microphanerophyts; mp), Nanophanerophyts; np), Therophyts; Th), Geophyts; G) and Hemicryptophyts; H) were defined from of the classification proposed by Raunkiaer (1934). Morphological types (trees, shrubs, shrubs, lianas and herbs) and chorological affinities, namely Guinean-Congolese species (GC), Sudano-Zambezian species (SZ), species from regions of transition zones (GC-SZ) and introduced species (i)) were defined according to Aké-Assi (2001; 2002). The degree of domestication (cultivated species or not) was adopted according to Dongock *et al.* (2008) and Kouamé *et al.* (2020).

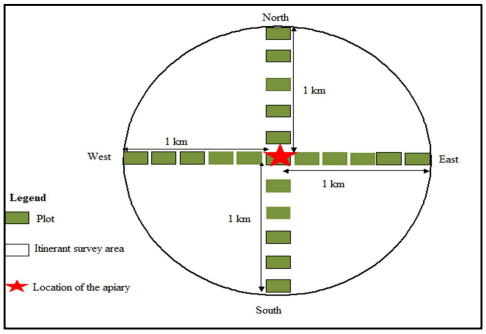

Fig. 2. Overview of the data collection system.

Results and discussion

Floristic richness

Floristic inventories around the apiary have made it possible to identify 72 species of honey plants, divided into 66 genera and 29 botanical families.

The most representative family in terms of number of species and the most diverse in genera is that of the Fabaceae with 20 species, or 26.38% of the honey plants inventoried. Then come the families of Verbenaceae with 7 species or 9.72% and Asteraceae with 5 species or 6.94%. The genera richest in species are: Cassia (3 species), *Aspilia, Phyllanthus, Clerodendrum* and *Spermacoce* with two species each. Table 1 presents the list of honey species in the domain, the botanical families, the morphological and biological types, the chorological affinities, the type of nutrient collected by the bees and the flowering seasons.

Distribution of honey species by phytogeography or phytochory

The farm's honey flora consists mainly of transitional plant species (GC-SZ) (Fig. 3.), with 40 species or 55.5% of honey plants. Then the Sudano-Zambezian species (SZ) with 18 species, or 25% and the Guinean-Congolese species (GC) with five (5) species, or 7%. Nine (9) are introduced species (i) or 12.5% of honey plants.

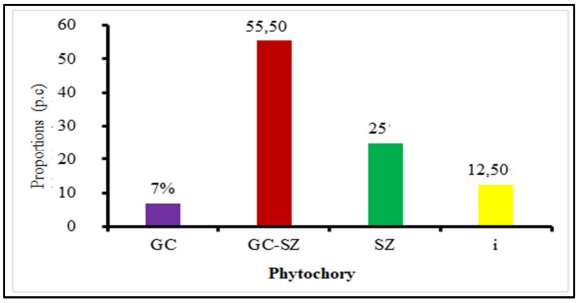

Fig. 3. Chorological distribution of melliferous species in the three lakes farm.

Table 1. List of honey plants at the three lakes farm.

N°	Species	Morph	Biol	Choro	DD	Typ nut	Flowering seasons
Amaranthaceae							
1	*Alternanthera pungens* Kunth	Grass	Ch	GC-SZ	Cu	Nectar	Rainy season
Anacardiaceae							
2	*Mangifera indica* L.	Tree	Mp	i	Cu	Nectar	Dry season
Annonaceae							
3	*Annona senegalensis* Pers.	Grass	Np	GC-SZ	Sp	Pollen	Dry seasonand Rainy season
4	*Uvaria chamae* P.Beauv.	Shrub	mp	GC-SZ	Sp	Nectar	Rainy season
Arecaceae							
5	*Borassus flabellifer* L.	Shrub	mp	SZ	Sp	Nectar	Rainy season
6	*Elaeis guineensis* Jacq.	Tree	mp	GC	Cu	Pollen	Dry season and Rainy season
Asteraceae							
7	*Ageratum conyzoides* L	Grass	Th	GC-SZ	Sp	Nectar	Rainy season
8	*Aspilia africana* (Pers.) Adams. var. *africana*	Shrub	Np	SZ	Sp	Nectar and pollen	Rainy season
9	*Aspilia rudis* Oliv. & Hiern. Subsp. Rudis	Shrub	Np	GC-SZ	Sp	Nectar and pollen	Rainy season
10	*Chromolaena odorata* (L.) R. King & H. Robinson.	Grass	mp	GC	Sp	Nectar and pollen	Dry season
11	*Vernonia nigritiana* Oliv. & H iern	Liana	H	SZ	Sp	Nectar and pollen	Dry season
Bombacaceae							
12	*Ceiba pentandra* L.	Tree	MP	GC-SZ	Sp	Nectar	Dry season
Cannaceae							
13	*Canna indica* L.	Grass	H	i	Cu	Nectar	Rainy season
Caricaceae							
14	*Carica papaya* L.	Grass	mp	SZ	Cu	Nectar	Rainy season
Chrysobalanaceae							
15	*Parinari curatellifolia* Planch. ex Benth.	Shrub	mp	GC	Sp	Nectar	Rainy season
Combretaceae							
16	*Anogeissus leiocarpa* (DC.) Guill. & Perr.	Shrub	mp	SZ	Sp	Nectar	Dry season
17	*Terminalia schimperiana* Hochst.	Tree	mp	SZ	Sp	Nectar	Dry season and Rainy season
Ebenaceae							
18	*Diospyros mespiliformis* Hochst. ex A. DC.	Shrub	mP	GC-SZ	Sp	Nectar	Rainy season

Euphorbiaceae							
19	*Bridelia ferruginea* Benth.	Tree	mp	GC-SZ	Sp	Nectar and pollen	Rainy season
20	*Flueggea viraso* (Roxb.ex willd)	Shrub	Np	i	Sp	Nectar	Rainy season
21	*Ricinus communis* L.	Shrub	mp	GC-SZ	Sp	Nectar	Rainy season
Fabaceae							
22	*Calopogognium mucunoides* Desv.	Liana	mp	GC-SZ	Sp	Nectar	Rainy season
23	*Cassia hirsuta* L.	Shrub	Np	i	Sp	Nectar	Rainy season
24	*Cassia sieberiana* DC.	Shrub	mp	GC-SZ	Sp	Nectar	Rainy season
25	*Cassia tora* L.	Shrub	mp	GC-SZ	Sp	Nectar	Rainy season
26	*Crotalaria retusa* L.	Shrub	mp	GC-SZ	Sp	Nectar and pollen	Rainy season
27	*Daniellia oliveri* (Rolfe) Hutch. & Dalz.	Shrub	Np	GC-SZ	Sp	Nectar	Rainy season
28	*Desmodium velutinum* (Willd.) DC	Shrub	mP	SZ	Sp	Nectar	Rainy season
29	*Detarium macrocarpun* Harms.	Grass	G	GC-SZ	Sp	Nectar and pollen	Rainy season
30	*Eriosema molle Hutch*. ex Milne-Redh.	Grass	Np	GC-SZ	Sp	Nectar and pollen	Rainy season
31	*Lonchocarpus cyanescens* (Schum. & Thonn.) Benth.	Shrub	mP	GC-SZ	Sp	Nectar	Rainy season
33	*Mimosa invisa* Mart. ex Colla.	Liana	Np	SZ	Sp	Pollen	Rainy season
34	*Mucuna pruriens* (L.) DC.	Liana	Th	i	Sp	Nectar and pollen	Rainy season
35	*Parkia biglobosa* (Jacp.) R. Br. ex G. Don f.	Shrub	mp	SZ	Sp	Nectar and pollen	Dry season
36	*Pericopsis laxiflora* (Benth.) van Meeuwen.	Liana	mp	GC-SZ	Sp	Nectar	Rainy season
37	*Piliostigma thonningii* (DC.) Hochst.	Shrub	mp	GC-SZ	Sp	Nectar	Dry season
38	*Stylosanthes erecta* P. Beauv.	Grass	Ch	GC	Sp	Nectar	Rainy season
39	*Tamarindus indica* L.	Grass	mp	SZ	Sp	Nectar and pollen	Dry season
40	*Tephrosia platycarpa* Cuill. & Perr.	Grass	Np	GC-SZ	Sp	Nectar and pollen	Rainy season
Flacourtiaceae							
41	*Flacourtia flavescens* Willd.	Shrub	mp	SZ	Sp	Pollen	Rainy season
Lamiaceae							
42	*Hoslundia opposita* Vah.	Liana	np	GC	Sp	Pollen	Rainy season
43	*Ocimum gratissimum* L. var *gratissimum*	Liana	Np	GC-SZ	Cu	Nectar and pollen	Dry season and Rainy season
Lauraceae							
44	*Persea americana* Mill.	Tree	mp	i	Cu	Nectar and pollen	Rainy season
Malvaceae							
45	*Sida acuta* Burn.f.	Shrub	Np	GC-SZ	Sp	Nectar and pollen	Dry season and Rainy season
46	*Urena lobata* L. var. *lobata* (Cav.) Gürke	Shrub	Np	GC-SZ	Sp	Nectar	Dry season
47	*Waltheria indica* L.	Shrub	Np	GC-SZ	Sp	Nectar and pollen	Dry season
Meliaceae							
48	*Azadirachta indica* A. Juss.	Tree	mp	i	Cu	Nectar	Rainy season
49	*Khaya senegalensis* (Desr.) A. Juss	Shrub	mP	GC-SZ	Sp	Nectar and pollen	Dry season
50	*Trichilia emetica* Vahl.	Shrub	mp	GC-SZ	Sp	Nectar	Rainy season
Musaceae							
51	*Musa sapienthum* L.	Grass	G	i	Cu	Nectar	Dry season and Rainy season
Ochnaceae							
52	*Lophira lanceolata* Van Tiegh. ex Keay.	Tree	mP	GC-SZ	Sp	Nectar	Dry season and Rainy season
Pedaliaceae							
53	*Ceratotheca sesamoides* Endl.	Shrub	Ch	GC-SZ	Sp	Nectar	Rainy season
Phyllanthaceae							
54	*Hymenocardia acida* Tul. var *acida* (Pax) Radc.	Shrub	mp	GC-SZ	Sp	Nectar	Dry season and Rainy season
55	*Phyllanthus discoideus* (Baill.) Mûll. Arg.	Shrub	mp	GC-SZ	Sp	Nectar	Rainy season
56	*Phyllanthus muellerianus* (O.Ktze.) Exell.	Liana	mp	GC-SZ	Sp	Nectar	Rainy season
Poaceae							
57	*Brachiaria brizantha* (A.Rich.) Stapf	Grass	H	GC-SZ	Cu	Nectar and pollen	Rainy season
Rubiaceae							
58	*Spermacoce stachydea* DC. *var. stachydea*	Shrub	Th	GC-SZ	Sp	Nectar	Dry season
59	*Spermacoce hepperana* Verdc.	Grass	Th	GC-SZ	Sp	Nectar	Dry season and Rainy season
Sapindaceae							
60	*Blighia sapida* K. D. Koenig.	Shrub	mP	SZ	Sp	Nectar and pollen	Rainy season
61	*Paullinia pinnata* L.	Liana	mp	SZ	Sp	Nectar	Rainy season
Sapotaceae							
63	*Vitellaria paradoxa* subsp.	Tree	mP	GC-SZ	Sp	Nectar and pollen	Dry season

Solanaceae							
64	*Solanum dasyphyllum* Schum. & Thonn	Shrub	Np	GC-SZ	Sp	Nectar and pollen	Rainy season
Tiliaceae							
65	*Grewia capinifolia* Juss.	Shrub	mp	i	Sp	Nectar and pollen	Dry season and Rainy season
Verbenaceae							
67	*Clerodendrum capitatum* (Willd.) Schum. & Thonn	Shrub	Np	SZ	Sp	Nectar	Rainy season
67	*Clerodendrum polycephalum* Bak.	Shrub	Np	GC-SZ	Sp	Nectar	Rainy season
68	*Gmelina arborea* Roxb.	Shrub	Np	SZ	Sp	Nectar and pollen	Dry season
69	*Lippia multiflora* Moldenke.	Shrub	Np	GC-SZ	Sp	Nectar and pollen	Dry season
70	*Stachytarpheta cayennensis* (L.C.Rich.) Vahl	Shrub	Np	GC-SZ	Sp	Nectar	Rainy season
71	*Tectona grandis* L. f.	Tree	mP	GC-SZ	Sp	Nectar and pollen	Dry season and Rainy season
72	*Vitex doniana* Sweet.	Shrub	mp	SZ	Sp	Nectar	Dry season

Morphological types of melliferous species

The farm's honey species are divided into four (04) morphological types (Fig. 4.). Among these morphological types, shrubs and shrubs are dominant with 49.99%. They are followed by grasses with 19.44%, trees with 16.67% and lianas with 13.9% of the inventoried species.

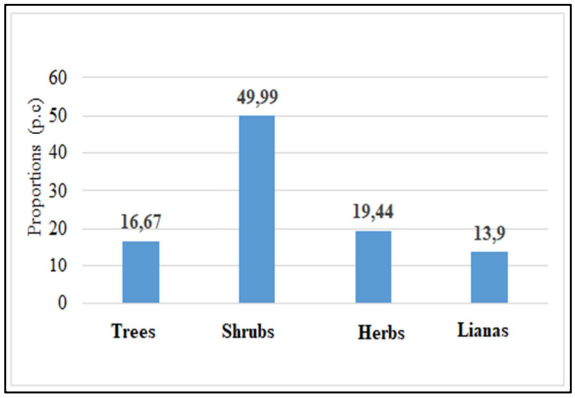

Fig. 4. Distribution of honey species by biological type.

Biological types of honey species

The honey flora of the site is characterized by a dominance of phanerophyts (80.55%) as shown in Fig. 5. Among the phanerophyts, the microphanerophyts, with 40.27% of the inventoried flora, are the most represented.

The other biological types follow in decreasing order of the number of species they contain. These are the nanophanerophyts (29.17%), the megaphanerophyts (11.11%) and the mesophanerophyts (2.78%). The hemicryptophyts represent 4.17%, therophyts have a proportion of 5.55%, chamephyts represent 4.17% and geophyts with 2.78%.

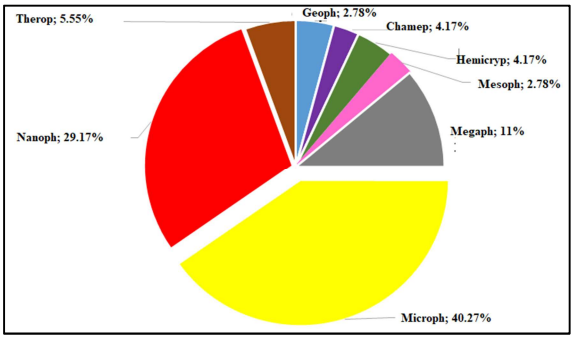

Fig. 5. Diagram of the biological types of melliferous plants at the three lakes farm.

Flowering periods of honey plants

According to the flowering seasons of the melliferous species, there are three (03) groups of melliferous plants: the melliferous plants flowering only during the humid months of the zone; they are the plants of the rainy seasons. They are the best represented with 45 species, or 62.5% of the inventoried honey plants.

Plants blooming during dry months in the area follow with 16 species or 22.22% of honey plants; they are called dry season plants.

The species blooming during the dry and humid months of the zone are the least represented with 11 species or 15.28% of the honey plants; they are the plants of the dry and rainy seasons.

The Fig. 6. shows the distribution of the farm's honey plants according to the flowering seasons.

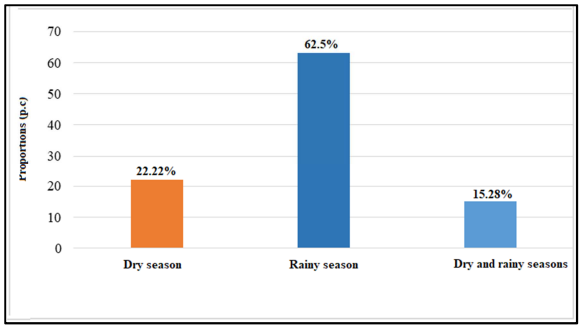

Fig. 6. Distribution of honey plants by flowering season.

Distribution of species by type of nutrient collected by bees

According to the nutrients collected from the flowers of the species, there are three (03) groups of honey plants. The first group is that of nectariferous plants. These are the species whose flowers are visited by bees for nectar. They are the best represented with 42 species or 58.33% of honey plants. The second group is that of pollinating plants. These are the species whose flowers are visited by bees for pollen. 25 species belong to this group representing 34.72% of listed honey plants. The third group is that of nectaro-pollinating plants. These are species that are visited by bees for both types of nutrient. Five (05) species belong to this group, ie 6.95% of honey plants. The Fig. 7. below shows the distribution of honey plants on the farm according to the nutrients collected by the bees.

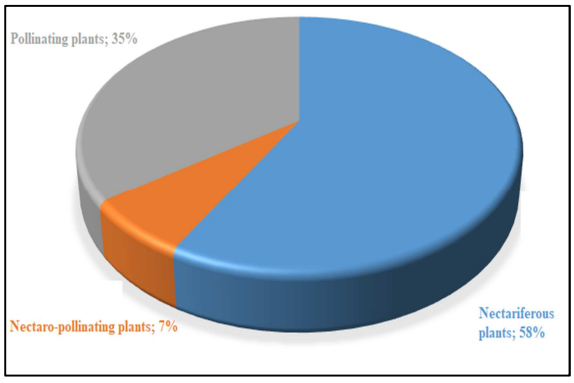

Fig. 7. Distribution of honey plants by type of nutrient.

Degree of domestication of honey plants

The melliferous plants of the site are in majority (93.06%) spontaneous plants (Fig. 8.). Five (05) are cultivated. They are: *Azadirachta indica* A. Juss. (Meliaceae), *Brachiaria brizantha* (A.Rich.) Stapf (Poaceae), *Musa sapientum* L. (Musaceae), *Persea americana* Mill. (Lauraceae) and *Ocimum gratissimum* L. var. *gratissimum* (Lamiaceae).

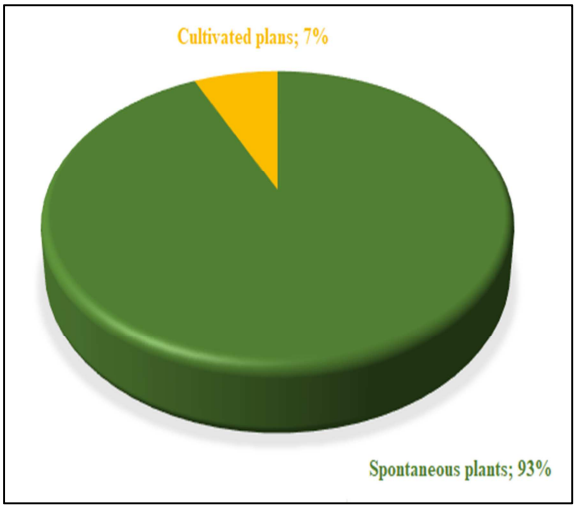

Fig. 8. Distribution of honey plants according to the degree of domestication.

The number of species recorded in this study, which is 72 species, is lower than that observed by Kouassi *et al.* (2019) who inventoried 126 species in the department of Katiola. by Iritié *et al.* (2014) who inventoried 160 species in the arboretum of the higher school of agronomy of Yamoussoukro and Assi-Kaudjhis *et al.* (2020) who identified 157 species in the Toumodi department. The numerical differences in the specific richness of honey plants in these studies are certainly due to the differences in the floristic composition of the ecosystems concerned, the environmental conditions (particularly climatic), the methodological approach as well as the foraging ethology of bee (Coulibaly *et al.*, 2019). Indeed, a plant may be honey in one area and not be in another (De Layens and Bonnier, 1997). In addition, the choice of plants to be foraged by bees would be based on the nectar content of its flowers. According to Philippe (1991) in fact, bees only forage on flowers with a nectar sugar content greater than 15 p.c. However, this content may vary depending on the environmental conditions of the environment. The predominance of honey plants from certain botanical families (Fabaceae and Asteraceae) constitutes an undeniable floristic asset for beekeeping production in the north of Côte d'Ivoire. Indeed, the abundance of species from these families is a general characteristic of the natural vegetations of the Sudano-Guinean and Sudanese zones (Sawadogo, 1993 ; Aloma, 2000 ; Nombré, 2003).

The predominance of forest-savanna transition species at 55.5% confirms that the study area belongs to the sub-Sudanese domain. This result is similar to that of Kouassi *et al.* (2019) and Assi-Kaudjhis *et al.* (2020). This result also corroborates that of Adou *et al.* (2017), who obtained a high number (43%) of transition species (GC-SZ) in all the vegetations of the Haut Bandama Reserve (RFFHB); reserve belonging to the sub-Sudanese domain such as the three lakes farm.

The predominance of microphanerophyts in the present study is due to the fact that agro-pastoral activities, which take place on the farm, result in the elimination of therophyts which are believed to be the most dominant. The distribution of species by morphological type showed a high rate of shrubs (33.72%) among the inventoried honey species. The high number of shrubs could be explained by the excessive felling of trees and shrubs by local populations for firewood, for making charcoal and furniture etc. This is the case with species such as *Bridelia ferruginea* Benth., *Ceiba pentandra* L. and *Terminalia schimperiana* which are constantly slaughtered for charcoal production.

According to Koulibaly (2008) and Kpangui (2015), charcoal is one of the main sources of deforestation in savannah areas.

The inventoried honey flora shows a predominance of plants flowering during the rainy seasons of the study area. The same observation was made by Iritié *et al.* (2014) in the department of Yamoussoukro and by Assi-Kaudjhis *et al.* (2020) in the Toumodi department. In fact, from the first rainy season (early June), almost all of the herbaceous plants vegetate, after the water deficit of the dry season, before gradually starting their flowering, which peaks in September. According to Ramirez (2002), floral phenology in herbaceous plants appears to be constrained by drought.

It clearly appears that, in the present study, nectar-bearing plants are the most abundant. These results corroborate those of Kouassi *et al.* (2019) who also observed the same trend in Katiola. In comparison to the work of Assi-Kaudjhis *et al.* (2020) in the transition zone and those of Kouamé *et al.* (2020) in the forest zone, it should be noted that there is a gradient of increasing importance in the proportion of nectar-bearing plants from the Guinean zone to the Sudanese zone, a gradient already noted by Yédomonhan *et al.* (2009). This also corroborates the observations of De Layens and Bonnier (1997) and Fluri *et al.* (2001a and b) according to which nectar production depends in particular on climate and latitude. The high number of species of honey plants is an important asset for beekeeping and honey production (Vestalys and Andrianarivelo, 2008 ; Coulibaly *et al.,* 2019 ; Fluri *et al.,* 2001b). The high percentage of nectariferous plants would be linked to the quality of the nectar of the honey plants of the study site, to a constant need for nectar by the bees for the production of honey and to increase their reserve in the hives in order to pass the difficult periods (famine period).

The present study revealed that the spontaneous species are the most abundant in the inventoried flora. This abundance of spontaneous plants could be explained by the fact that, besides the pastoral activity practiced on the farm, no agricultural activity is practiced with the introduction of crops. The flora of the site is therefore dominated by uncultivated plants. This same observation was made by Kouamé *et al.* (2020) in the Yapi Daniel Reserve and its surroundings with 85.41% of spontaneous honey plants. This justifies the fact that the environment is not subjected to agricultural pressures.

Conclusion

The floristic inventory of the Ferme des Trois Lacs has identified 72 species of honey plants. These species are divided into 66 genera and grouped within 29 botanical families. The best represented family in terms of number of species is the Fabaceae. The majority (62.5%) of honey species flower during rainy seasons and are mostly visited (58.33%) by bees for nectar. The dominant morphological types are shrubs with 33.72% of honey plants. The microphanerophyts are the most representative with 40.27% of the honey plants. The distribution of species in phytochory gives a high number of transitional species (GC-SZ) with 55.5% of honey plants.

This pioneering study on the identification of honey plants in the department of Dabakala is a contribution to understanding the region's honey potential and, for a better beekeeping orientation. It could extend to mellissopalynology and physicochemical analyzes to determine the floral origin and the quality of the honeys in the area.

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