

**Ethnotaxonomy and ethnobotanical studies of honey and resinous plants in the Tchamba prefecture in Togo.**

**ABSTRACT**

Natural plant products have gained increasing attention, but climate change and human activities have led to the degradation of ecosystems and loss of biodiversity. This study aims to contribute to the preservation of local knowledge related to the classification and use of honey-producing and resinous plants in the Tchamba prefecture, Togo. Ethnotaxonomic and ethnobotanical data were collected through semi-directed interviews and focus groups in the four localities, involving 92 respondents. A total of 96 plants of beekeeping were identified, classified into 88 genera, 33 families, and 22 orders, with 16 ethnotaxonomic criteria used for classification. The most common criteria were "plant use" and "plant habit". The study highlights the rich local knowledge of plant uses for food, medicine, and rituals, emphasizing the importance of conserving both biodiversity and cultural heritage. These findings contribute to understanding how indigenous knowledge can support conservation and sustainable use of plant resources.

**Keywords:** Honey and resinous plants, Endogenous knowledge; Vernacular phytonyms; Ethnotaxonomy; Togo.

**INTRODUCTION**

Ancestral practices have long been used as a conservation tool. Since the signing of the Convention on Biological Diversity [1], the political and legal dimensions of biodiversity conservation have become increasingly important. Among these, the exploration of traditional knowledge and indigenous and local associations has become a central issue in the negotiations [2]. Human beings have recourse to nature, that is to say their immediate

environment, to solve the major problems of their existence[3]. Plant species constitute one of the most diversified natural resources and a major provider of goods and services to indigenous populations[4]

The decline in forest cover worldwide is one of the most serious threats facing the planet. This decrease is accompanied by serious environmental and economic consequences, including the destruction of the habitat of endangered species, the increase in greenhouse gas emissions that contribute to climate change, water scarcity and the loss of livelihoods of communities and populations dependent on the forest [5]. The main causes are rapid changes in social and cultural behavior, reduced contact with nature, the disappearance of natural ecosystems [6;]and the non-intergenerational transmission of knowledge [7;8]. In Togo, the central region has experienced deforestation in recent decades. According to the 2020 report of the Ministry of Environment and Forest Resources, its forest area has passed from 442,190 hectares in 2003 to 415,201 hectares in 2018, a decrease rate of 1.32% per year.

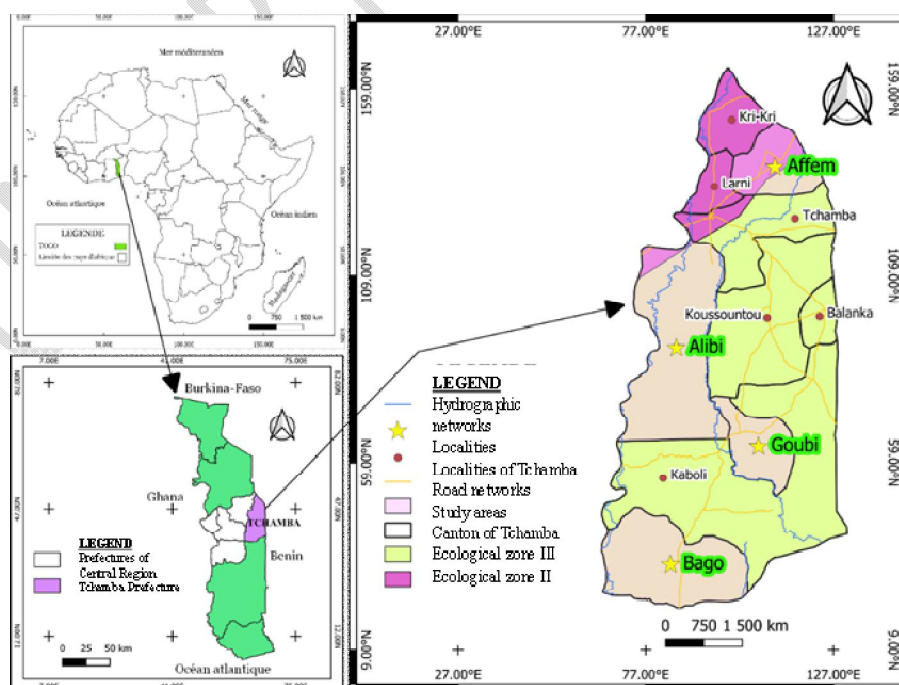
In the nomenclatural differentiation between plants in general, and honey-producing and coniferous species in particular, local populations have endogenous knowledge to identify and name plants according to their usefulness, ecological, organoleptic and cultural characteristics [9]. Understanding these popular plant classification systems is part of ethnotaxonomy. In addition, in a context of loss of endogenous knowledge related to the classification and nomenclature of plants, it helps to reverse the trend by safeguarding this endogenous knowledge. Furthermore, the study of this knowledge in terms of traditional nomenclatural processes would help to better understand the local flora[10;11]. Alongside the knowledge related to the identification and classification of plants, population develops on the basis of their experiences, knowledge in the use of plants and those in several fields. Given that they are an essential component in the conservation of local biodiversity[12;13], the safeguarding of local knowledge related to the use of honey and resinous plants becomes a necessity.

This study aims to contribute to a better understanding of knowledge related to traditional systems of popular classification, nomenclature and local uses of honey and resinous plants in the Tchamba prefecture in Togo. More specifically: **(i)** Study the current diversity of honey and resinous plants in the Tchamba prefecture; **(ii)** Analyze the systems and methods of popular classification used by the local population of the Tchamba prefecture to identify honey and resinous plants; **(iii)** Identify the uses of honey and resinous plants among the population.

## 2. METHODOLOGY

### 2.1. Study area

The Tchamba prefecture is the study area. It is located in the central region and ecofloristic zones III and II [14], between 8°49 North latitude and 1°25 East longitude (Figure 1) and covers an area of approximately 3,197 km<sup>2</sup>. It is bordered to the North and North-West by the Tchaoudjo prefecture; to the South by the East-Mono prefecture; to the South-West by the Sotouboua prefecture; to the East by the Republic of Benin.



**Figure 1:** Location of the study area

### **2.3. Data collection and processing**

In the prefecture, 4 cantons were selected for conducting the investigations. These are Affem-Boussou, Alibi 1, Goubi and Bago. The documentary research provided the secondary data essential to the study. A primary list was drawn up at the beginning using an interview with the prefectural environmental management, peasant organizations in the beekeeping sector. Then direct observations made it possible to confirm the nature of the plants identified during the consultation of stakeholders involved in beekeeping and the production of plant resin. The ethnotaxonomic and ethnobotanical surveys are carried out using semi-directed interviews and focus groups (bringing together 6 to 12 people from various socio-professional categories). The data on floristic diversity were harmonized in the Excel 2019 spreadsheet. The floristic richness is assessed using the specific richness, diversity in genus, families and order [15] encountered during the surveys in the different plots. The species not identified in the field were collected and determined at the Herbarium of the University of Lomé. The nomenclature used is that of the Angiosperm Phylogeny Group IV (APG IV) and the scientific names corrected using Brunel's nomenclature.

## **3. RESULTS**

### **3.1. Floristic richness of honey-producing and resinous plants**

The observation data coupled with that of the surveys made it possible to identify a total of 96 plants of beekeeping interest. They are divided into 88 genera, 33 families and 22 Orders. The most important orders are: Fabales (23.96%) followed by Sapindales (13.54%), Gentianales (10.42%), Malvales (9.38%), Malpighiales (7.29%). The most represented families are Fabaceae (22.92%), followed by Malvaceae (9.38%), Apocynaceae and Euphorbiaceae (5.21%).

### 3.2. Characterization of plants of beekeeping interest

The species listed can be divided into five (5) categories according to the resources collected by bees. Among the species listed, 46 species or 47.72% are exclusively nectariferous, 28 species or 29.17 are nectaro-polliniferous and 19 species or 17.79 are polliniferous.

### 3.3. Ethnotaxonomy of honey and resinous plants

For all the species listed, the vernacular phytonyms were collected in Tchamba, Ana, Bago-Koussountou and Anii where the population presumes to forget the non-vernacular of some plants. It appears that the majority of local flora species each have a vernacular name to the detriment of those introduced which are full of certain species for which the local community has not found a vernacular name. This is the case of: *Albizia lebbbeck*, *Delonix regia*, *Eucalyptus camadulensis*, *Acacia auriculiformis* and *Cascabelathevetia*. In some localities, *Senna siamea* is also classified on this list. *Spermacocestachydea* also still does not have a vernacular name in any locality.

As for the literal transcription, more than 40% of the names recorded had no meaning. Furthermore, some species have, in addition to their names known by the community, other names, namely Kabbalistic names (used by wise men or initiates for rituals), names referring to onomatopoeia (which is related to the noise made by an organ of the plant) and/or names that refer to real stories that have marked the community and that have involved these species.

This is the case for example of *tridax procumbens* in Ana in Goubi which alone bears three designations by motivation:

- ❖ the first name "Ikoulé-koudoḡo", which is common and means "Feces of the solitary locust",

- ❖ the second name "Okoukouossé-afouagnon" which means "sticky sauce of Afouagnon" and comes from a real story, and
- ❖ the third name "kakaṽkṽ-mafagnigbé" which literally translates as "I prefer to lean against" refers to the ethnotaxonomic criterion of resistance to water stress. The species *Annona senegalensis* called "Ambo" or "Talibobo" which means tree to hypnotize has a Kabbalistic name which is "Ambokṽbṽe" and which still keeps its meaning. Other species such as *Adansonia digitata* and *Gréwiaflavescences* have only one vernacular name which is still Kabbalistic, These are respectively "Haussé" which means greatness and "YṽiYṽi" "in literal translation expresses the immense growth of the angular branches of the tree; in Ana "Yṽ" expresses growth. It is necessary to note the monophytonymy from the point of view of genus. In Ana, all the species belonging to the genus *Ficus* are called "Okpṽṽ". Despite the particularity of the ethnonyms listed it should be noted that certain ethnic groups are very close through the vernacular names and also their pronunciation.

### **3.3.1. Similarity of inter-ethnic and intra-ethnic vernacular names**

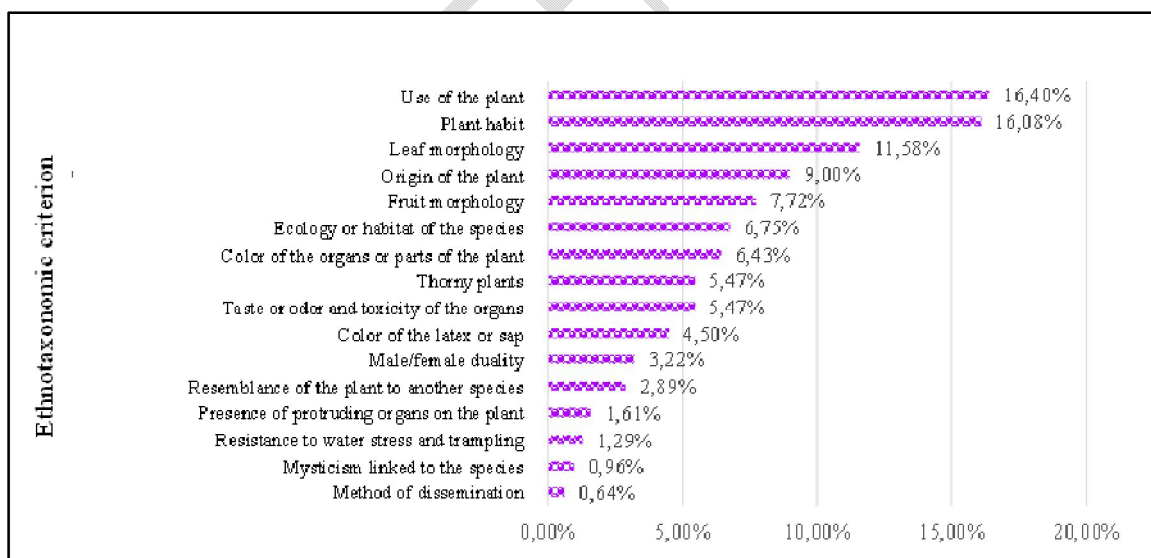
The vernacular names of plants are marked by a great linguistic diversity. This reflects the cultural and ethnic diversity in the prefecture of Tchamba. However, note that some phytonyms, from the vernacular point of view, have remained the same in all localities. These are two species: *Mangifera indica* and *Cajanus cajan*, respectively called "Mango" and "Kolo". The relevant remark is that these two names have no meaning. This makes it difficult to identify the reference ethnic group that first named these two plants. From a phytogeographic point of view, these are introduced species. The vernacular phytonym "Kolo" remains the same for the species *Anogessusleocarpus* and *Cajanus cajan*. But this name remains distinct in pronunciation.

### **3.3.2. Variation of vernacular names and ethnic influence**

Within each ethnolinguistic group, the variation of vernacular names has not been observed. Although the two ethnic groups (Tchamba and Anii) are relatively related, it is necessary to note the influence of the Tchamba ethnic group on that of the Anii. Given that the Tchamba language is the majority language, the Anii tend to abandon their language and speak Tchamba. The majority of the population of Affem claim not to know the phytonyms in Anii but claim to know them in Tchamba.

### 3.3.3. Ethnotaxonomic criteria used for traditional classification

The distinction of species is sometimes made on the basis of characteristics specific to each of them. These characteristics concern both usage and morphological and ecological characteristics. Taxa are also named by similarity criteria. The different criteria or approaches used to traditionally classify and identify plant species in the localities of the Tchamba prefecture have made it possible to produce the graph below (Figure 2).

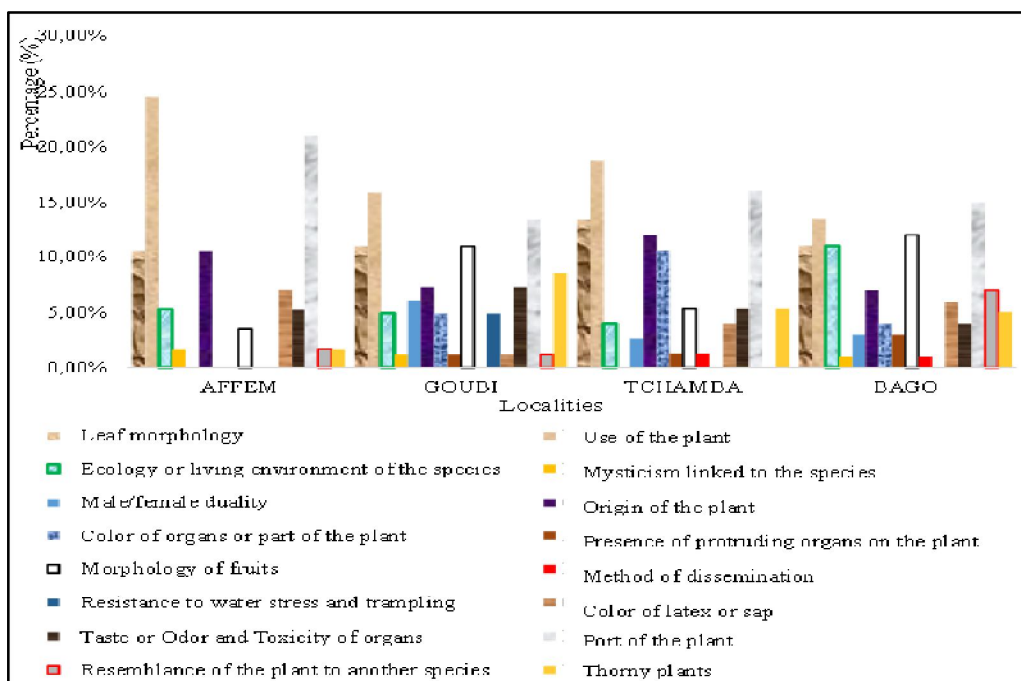


**Figure 2:** Percentage of citation of ethnotaxonomic criteria in the localities

A total of 16 ethnotaxonomic criteria are used to classify the 96 species identified. The criterion use made of the plant (16.40%) and the plant's shape (16.08%) are the criteria most

used by the local population. They are followed by the criteria that are moderately cited: leaf morphology (11.58%), origin of the plant (9.00%), fruit morphology (7.72%), ecology or the living environment of the species (6.75%), color of the organs or part of the plant (6.47%); the thorny plant criteria and the taste or smell and toxicity of the organs each representing 5.50%. The other criteria including the color of the latex or sap, the male/female duality, the resemblance of the plant to another species, the presence of protruding organs on the plant, resistance to water stress and trampling and the mysticism linked to the species being very little cited make 14.56% in total.

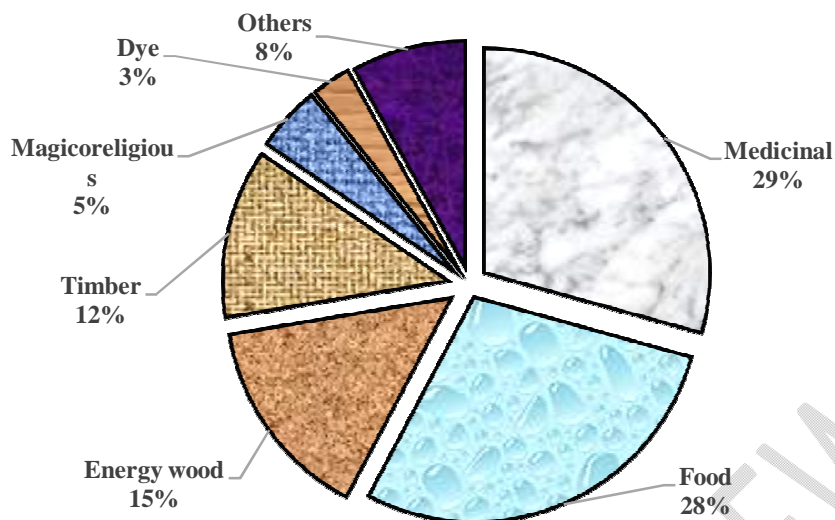
It emerges following the analysis of the 16 criteria by locality that the use and the bearing of the plant are the most dominant criteria in almost all the localities. Next come the criteria such as: the leaf morphology and the origin of the plant. The Ana and the Bago/Koussountou stand out with a high citation of the fruit morphology criterion with a percentage of 10.98 and 12% respectively against 3.51% and 4% respectively by the Anii and Tchamba. The ecological criterion or the species' living environment is much more cited in Bago with a percent of 11.11% while Affem, Goubi and Tchamba respectively have a percentage of 5.26%, 4.88% and 4%. The other criteria are less representative such as the taste or smell and toxicity of the plant (7.32%), the resemblance of the plant to a species (7%), the presence of organs such as thorns or prickles (8.54%) and the color of the latex or sap (7.02%) (Figure 3). The mode of dissemination, the presence of protruding organs, mysticism and resistance are the criteria very little used or sometimes absent in certain localities.



**Figure 3: Ethnotaxonomic criteria by locality**

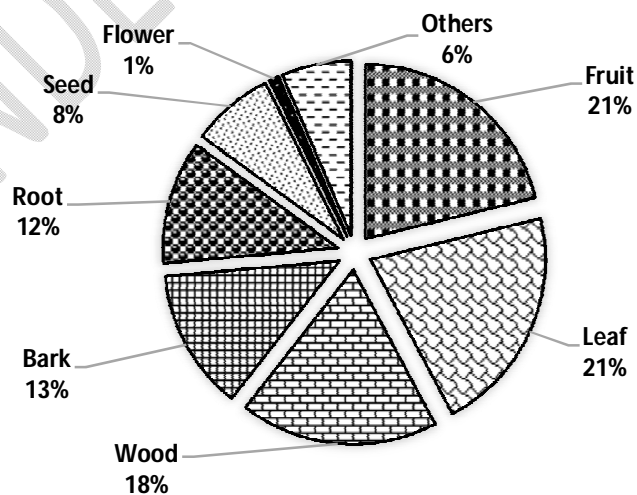
### 3.4. Types of uses of honey-producing and resinous plants

In all localities, the species recorded are indicated in several typologies of use divided into 13 types of uses. They are also a source of food, medicine and wood for the population. All the citations give as a percentage for medicinal needs 29.30% (or 92 species); 28.45% for food use (with 92 species); for energy wood needs 14.65% (or 21 species), 12.10% used in the production of timber (or 28 species); for magico-religious ceremonies or rituals 4.67% (or 17 species), for dyeing 2.76% (or 5 species) and others 8% (or 28 species) (Figure 4). As for other types of uses, these are crafts, ropes, packaging, fodder, cosmetics and hygiene. In addition, three plants (*Physalis angulata*, *Spermacocechaydea*, *Waltheria indica*) are plants considered to be useless according to this study, this may be due to a lack of knowledge of these plants by the speakers.



**Figure 4:** Proportion by type of use in all localities

Honey and resinous plants are species highly qualified by the population. Among the different organs used to obtain medical, food, spiritual or magicoreligious preparations, to obtain timber, energy, and many other services, almost all parts were cited. It appears that these uses mainly concern fruits (21.21%), leaves (21.04%), wood or trunk or stipe (18.28%). Also the use of the rest of the organs is not negligible including barks (13.06%), roots (11.44%), seeds (7.64%), flowers (0.90%) and others (6.43%). In others, we found the whole plant and the sap (Figure 5).



**Figure 5:** Percentage by type of organ used in all localities

#### 4. DISCUSSION

The prefecture of Tchamba is marked by a pronounced ethnic diversity. Each locality has a dialect that characterizes it. The vernacular phytonyms of the plants are almost different in all localities except a few species whose names have remained the same. These are *Mangifera indica* called "Mango" and *Cajanus cajan* "Kolo" which have the same vernacular name with a slight phonetic variation. This result corroborates that of [16], who also finds that "Mangu" (*Mangifera indica*) is the most widely shared vernacular name among the Diola ethnic group of Oussouye in Senegal due to the significant nutritional value of the fruit of the species and which has adapted very well to the ecological conditions of the environment. The biofertilizing and edible use of the species "Kolo" (*Cajanus cajan*) was found in all communities of the Tchamba prefecture. This may be a separate reason from the customary designation by the ethnic groups studied. The variation of vernacular names within each ethnic group was negligible, however the pronunciation mode influenced some names.

Studies conducted in vernacular phytonomic denomination have often very little addressed the analysis of two or more dialects belonging to different strains. The majority are focused on a single ethnic group. The work of [17], focused on the study of vernacular and scientific names of plants from North Africa (Algeria) considered two strains (Berber and Arab) and French. The results from this work are in the same direction as our results obtained. They found that the phytonyms of the three strains considered varied significantly. On the other hand, Savadogo and his collaborators [4] found that vernacular names remain practically the same in localities of the same region, the same administrative province or the same commune. However, although belonging to the same ethnic group, vernacular names vary widely from one region to another. In addition, the non-perception of variations in vernacular names within an ethnic group in our analyses could be due to the small number of speakers interviewed. Also, the smallness of the space occupied by certain ethnosociolinguistic groups can be the

cause of the non-variation of names. It is in this sense Khoufache[17] shows that vernacular phytonyms are located at the interface between synchronic linguistics and diachronic linguistics insofar as they transcend both time and space.

The striking differences in phytonomic denomination within the four prefectures reflect linguistic and cultural diversity. According to this study, it is much more pronounced within the Bago/Koussountou ethnic group, which has made much more use of other languages. On the other hand, Djihounouck and his collaborators [16; 18] also find within the Diola ethnic group of Oussouye that the pronunciation of the names of certain species can vary from one person to another within the same village or different villages. However, nominal interferences between traditional communities exist.

The nomenclature adopted to determine the ethnotaxonomic criteria of plant species is that of Savadogo and his collaborators [8]. This work has shown that the use made of the plant, the mysticism linked to the species, the ecology or the living environment of the species, the male/female duality, the color of the organs or parts of the plant are the most cited criteria. On the other hand, in addition to the use criterion which also remains in the majority, our work has highlighted much more criteria such as: the shape of the plant, the leaf morphology, the origin of the plant. The dominance of the criterion uses made of the plant would be due to the strong dependence of local populations on plants of beekeeping interest including honey-producing and resinous plants, in particular edible (cereals) and medicinal ones. The very weak criteria are due to the fact that few of these plants identified within the prefecture have these traits, or that these traits have been neglected in favor of other traits. Nevertheless, these results are in line with those of Djihounouck and his colleagues [18] for whom the reference linked to the (food) use is the majority and often associated with the use of the species in the preparation of services and means of the populations of Oussouye (Senegal) among the Dialo ethnic group.

For a long time, man has always remained dependent on natural resources. Plants have indeed always aroused multiple interests, and it is therefore not surprising that we always want to exploit them through rational use. According to the categories of use obtained from the population of the Tchamba prefecture, the resemblance of the species shows that the four ethno-sociolinguistic groups (Ani, Tchamba, Ana and Bago/Kounssountou) have the same preferences for ethnobotanical use (medicinal plants, food species, energy, etc.). This similarity would be due to the therapeutic and food use of honey-producing and resinous plants. These results corroborate those of Mokoso and his collaborators [19] who also found that the three ethno-sociolinguistic groups (Shi, Tembo and Pygmies) have the same preferences for ethnobotanical use. The predominance of organs such as fruit, leaves, wood revealed by this study is indicated by the results of Bériname and his collaborators [20]. However, these results are slightly different from those of Adomou and Mokoso[19; 21] for whom the most used organs are leaves, bark, fruits and roots. These results are much more frequent to have the peasant perception regarding medicinal plants. Generally, organs of many woody species are used in response to multiple needs of human communities, especially in rural areas where these species are part of the livelihoods of populations with social and economic values attached to each of them [22; 23]. The species *Anacardium occidentale* is a species with dual importance. It remains a species with high economic value for the indigenous population on the one hand, and, on the other hand; it is the plant most foraged by bees when it is in bloom according to the respondents. Being imported for its economic value, it endangers the species of the local flora.

## **CONCLUSION**

This study is conducted in four ethno-sociolinguistic groups of the Tchamba prefecture. It is conducted on the vernacular names of honey-producing and resinous plants and the uses by ethnic group. At the end, ninety-six 96 plants of beekeeping interest including two (02)

resinous were identified. They are divided into 88 genera, 33 families and 22 Orders. These plants are subjected to an ethnotaxonomic analysis based on the highlighting of the various approaches used by local communities to name and identify plants. Two criteria are highlighted: itThis is about "the use made of the plant" and "the bearing of the plant". The lexical units of plants not only carry linguistic information, but they also reflect the realities of the social and cultural life of the ethnic group. All the phytonyms treated in our study from the vernacular point of view generally highlight the authenticity of ethnic groups. Nevertheless, some characteristics related to the borrowing and mixing of languages are listed. It should be noted that vernacular phytonyms carry within them the cultural identity of an ethnic group.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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