

# Ethnobotanical Research on the Knowledge of *Vernonia amygdalina* Leaves in the Treatment of Liver Diseases in South Benin

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**Abstract:** Most of the inhabitants of South Benin use medicinal plants to treat various pathologies. Several research studies have cited *Vernonia amygdalina* as a hepatoprotective medicinal plant. The objective of this work is to list the medicinal plants made available to the population to treat liver diseases by herbalists and to verify their level of knowledge in relation to the use of *Vernonia amygdalina*. The methodology consists of conducting a semi-structured survey of herbalists in markets, on sites where medicinal plants are sold and in households. This methodology allowed us to identify 38 species of medicinal plants belonging to 20 families. The best represented species is *Bridelia ferruginea* (10) of the family Euphobiaceae. The Rubiaceae family is the most represented (16). The organ of the plant most frequently used in recipes is the root (47). Five hundred and fifty-two households (552) responded to our questions. 64% use the leaves of *Vernonia amygdalina* for nutrition against 36% for therapeutic use. 68% are supplied from distant fields, 13% from urban areas and 19% from market gardening sites. 35% say they have no information about its use in phytotherapy, 21% use it for intestinal ailments, 18% for the treatment of malaria, 13% for oral diseases, 12% for other pathologies. The frequency of use (four times a week) is best represented for nutrition and phytotherapy. In conclusion, *Vernonia amygdalina* is very little known in phytotherapy despite the various researches carried out on this plant. Researchers must promote medicinal plants that are very easy to grow in order to limit the offer to users of rare plants in danger of extinction.

**Keywords:** *Vernonia amygdalina*, Ethnobotanical Investigation, Liver Diseases

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## 1. Introduction

Liver disease is a public health problem in Benin today. Hepatitis B virus and chronic alcoholism are the primary cause of cirrhosis and hepatocellular carcinoma [1]. Chronic exposures to drugs and toxic products go unnoticed among the causes of hepatitis. Many scientific studies have shown that several drugs and toxic products induce hepatitis [2, 3].

With environmental degradation and the introduction of new cultivation methods based on the massive use of agricultural inputs, the population is inevitably chronically exposed to hepatotoxics. In Benin, traditional therapists and herbalists are the first people to receive the disease in most cases [4]. The latter provide the patient with a number of medicinal plants to address their health problem [5, 6]. The recipes made available to patients are multiple and vary from one

traditional therapist, one herbalist to another. All plant organs are offered: root, stem, leaves, bark and the whole plant. These proposals do not guarantee the conservation of the flora because in the majority of the recipes proposed for the treatment of pathologies, the roots and barks occupy a significant proportion. Instead of the rare species, other fast growing and easy to grow plants can be proposed in order to protect the environment. Scientific work has shown that *Vernonia Amygdalina* is very effective in the treatment of liver diseases [7-9]. *Vernonia Amygdalina*, is a medicinal plant used in nutrition and phytotherapy [10-12]. An ethnobotanical survey allows us to list the medicinal plants made available to patients suffering from this liver disease and to verify the level of knowledge of the population of South Benin on the different uses made of this nutritional and therapeutic plant.

## 2. Materials and Methods

### 2.1. Study Sites

#### 2.1.1. Cotonou Site

The commune of Cotonou is located on the barrier beach that stretches between Lake Nokoué and the Atlantic Ocean, made up of alluvial sands with a maximum height of about five metres. Its geographical coordinates are: latitude 6°21'55 N; longitude 2°25'5 E with an altitude of 7m above sea level. It is bounded to the north by the municipality of Sô-Ava and Lake Nokoué, to the south by the Atlantic Ocean, to the east

by the municipality of Sèmè-Kpodji and to the west by that of Abomey-Calavi. It covers an area of 79 km<sup>2</sup>. The commune of Cotonou, which is located in the coastal plain, has sandy soils that are generally poor in organic matter. All the districts of Cotonou comprise 154,346 households with a population of 665,100 inhabitants [13].

#### 2.1.2. Abomey-Calavi Site

The commune of Abomey Calavi, located in the southern part of the Republic of Benin and the Atlantic Department, is bordered to the north by the commune of Zè, to the south by the Atlantic Ocean, to the east by the communes of Sô-Ava and Cotonou, and to the west by the communes of Tori-Bossito and Ouidah. Its geographical coordinates are latitude: 6°26'55"N; longitude 2°21'20"E with an altitude of 11m above sea level. It covers an area of 539 Km<sup>2</sup> with 149 villages and city districts. Most of the commune is occupied by tropical ferruginous and sandy soils [14].

#### 2.1.3. Ouidah Site

The commune of Ouidah is located between 2° and 2°15 East latitude and 6°15 and 6°30 in the Atlantic Department. It covers an area of 364 km<sup>2</sup> and is bounded to the south by the Atlantic Ocean, to the east by the Commune of Abomey-Calavi, to the west by the Commune of Grand-Popo, and to the north by the Communes of Kpomassè and Tori - Bossito. There are sandy soils, ferralitic soils and sandy soils. The commune registered 76,555 inhabitants in 2002 with 18,958 households [15].

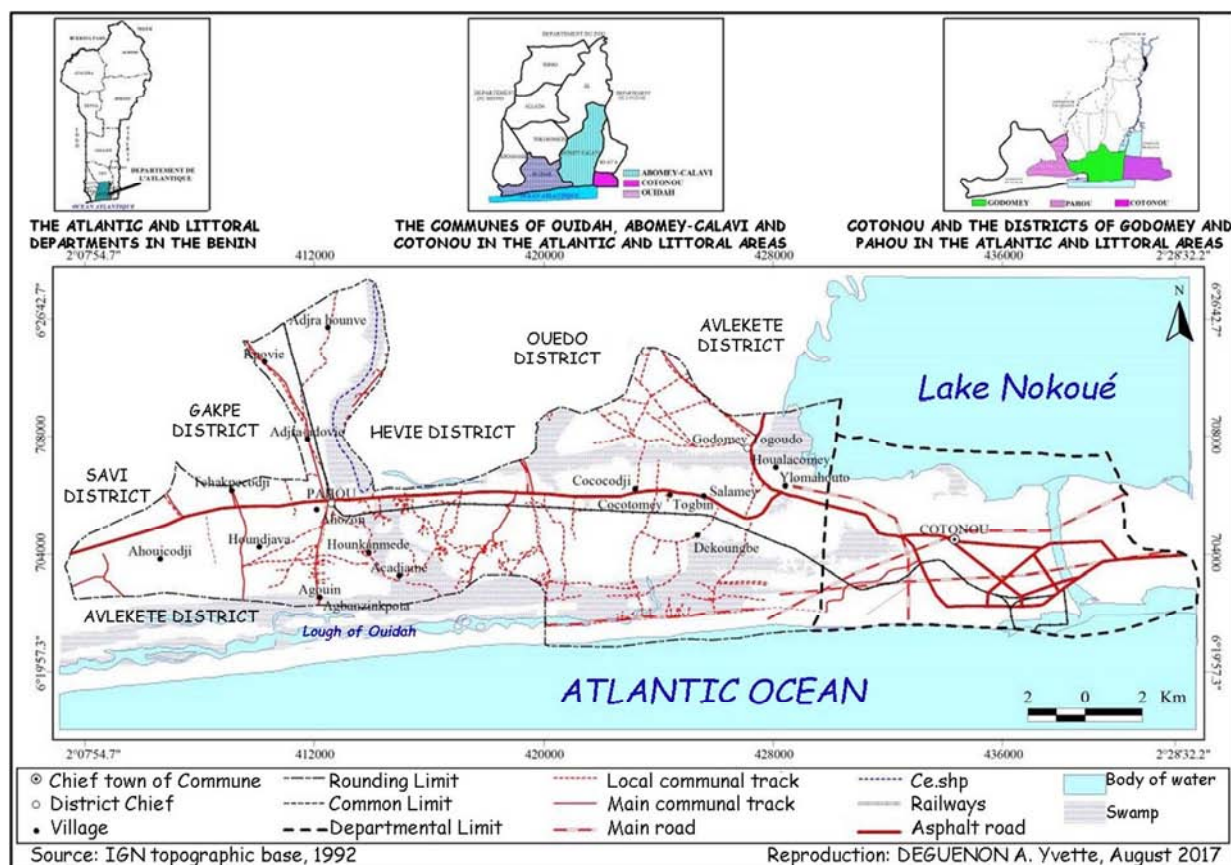


Figure 1. Situation map showing the three communes: Cotonou, Abomey-Calavi and Ouidah.

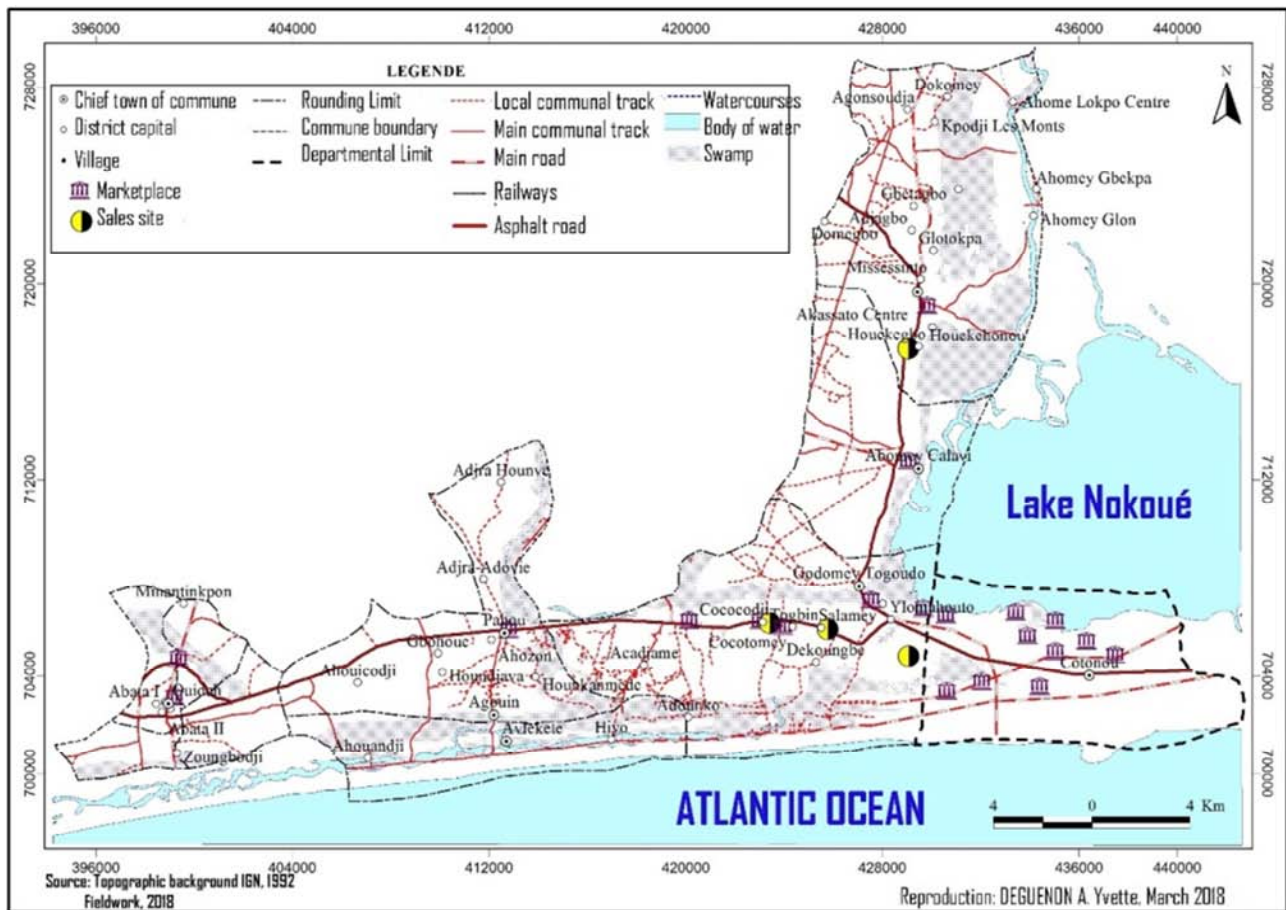


Figure 2. Medicinal plant collection sites and markets.

## 2.2. Sampling and Data Collection

A semi-structured survey among herbalists was carried out in three communes in southern Benin in order to list the medicinal plants available to the population in case of liver diseases. The medicinal plants received with each recipe are wrapped in aluminium foil for identification. Another survey is directed towards households in the same communes in semi-structured and focus group settings to find out the population's level of knowledge about *Vernonia amygdalina* in the treatment of liver diseases.

## 2.3. Statistical Processing of Data

The results obtained from ethnobotanical and household surveys are entered into Excel 2013. The XLSTAT 2019 software has allowed us to perform a descriptive analysis of

the data obtained

## 3. Results

The results of ethnobotanical surveys among herbalists and in households allowed us to appreciate the medicinal plants made available to the population for the treatment of liver diseases in Southern Benin and to verify the level of knowledge of this same population on the use of *Vernonia amygdalina* leaves. The ethnobotanical survey is being carried out in 19 markets and 4 sites selling medicinal plants in three communes of Southern Benin; Cotonou, Abomey-calavi, and Ouidah. The household survey was conducted in the same communes mentioned above. The results of the ethnobotanical survey among herbalists are summarized in the table 1.

Table 1. Descriptive statistics of medicinal plants identified during the survey.

Statistics	Species	Families	Organs
Nb. Of observations	88	88	88
Mode	<i>Bridelia ferruginea</i>	Rubiaceae	Root
Mode (effective)	10	16	47

The number of observations after the survey is 88. The plant species with a high population is *Bridelia ferruginea* of

the family Euphorbiaceae (Figure 3). On the other hand, the family Rubiaceae is more represented (Figure 4).



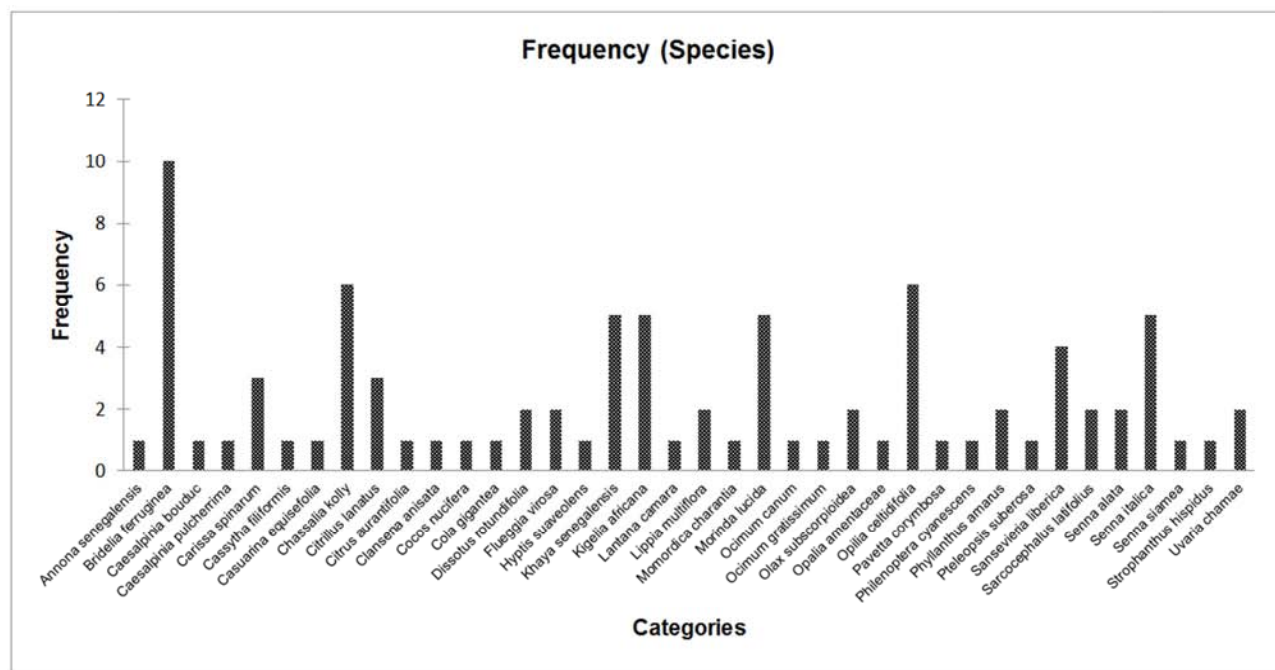


Figure 3. Number of species according to modality.

The species represented belong to twenty families (Figure 4).

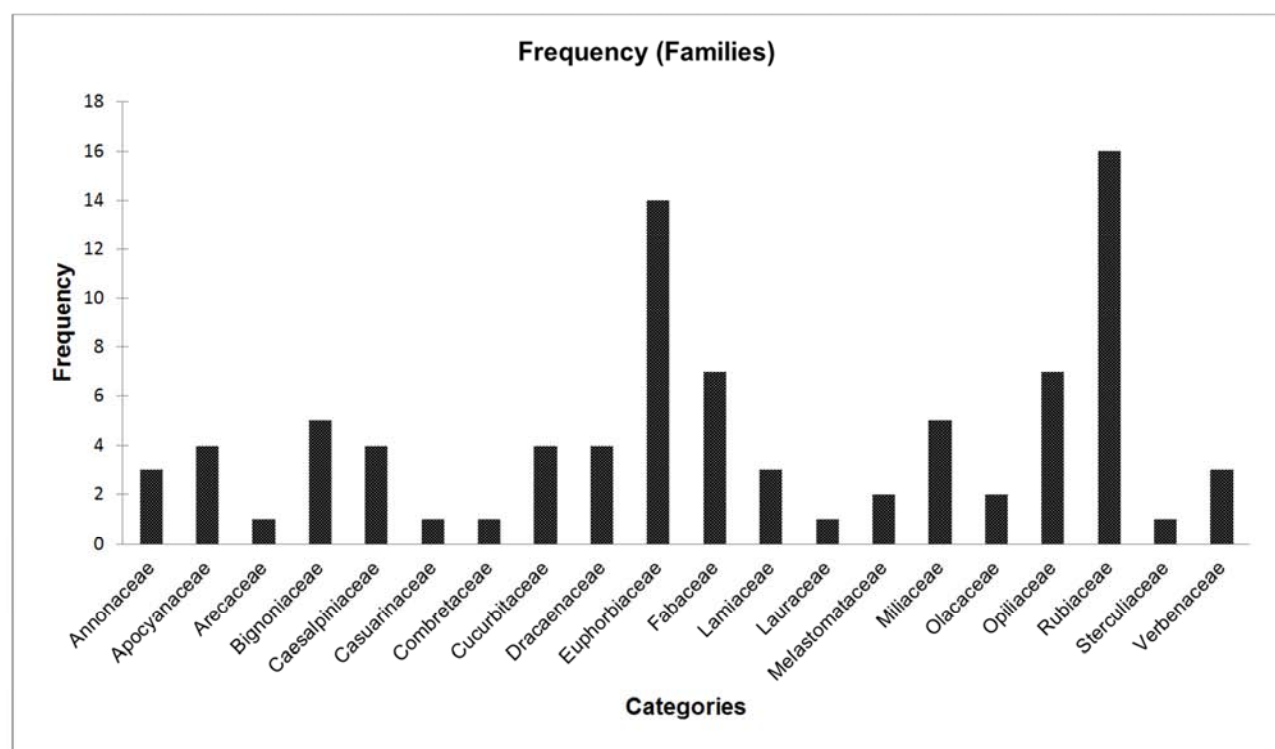


Figure 4. Number of families according to their modality.

In the course of the investigation, various parts of the medicinal plant were proposed in the preparation of traditional medicine remedies for the treatment of liver diseases. Roots account for 47%, leaves 25%, bark 12%,

leafy stems 1% and fruits 3% (Figure 5). This high representation of roots in the recipes proposed does not guarantee the protection of flora for sustainable development.

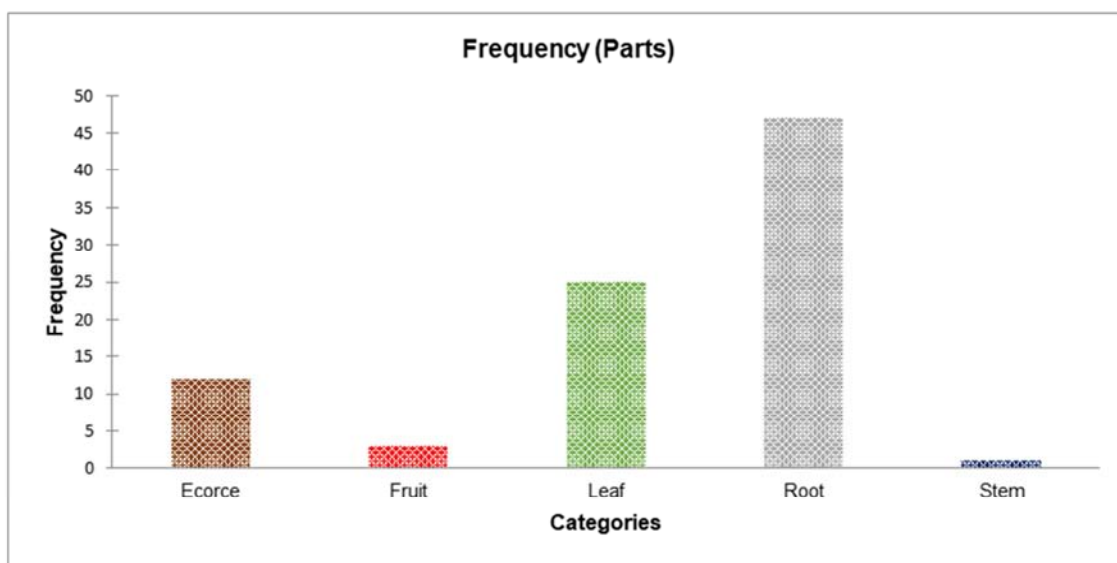


Figure 5. Number of organs of the plants harvested according to their modality.

A second survey is directed towards households on their knowledge of *Vernonia amygdalina*. A total of 552 respondents answered our questions. Regarding the use of *Vernonia amygdalina*, 64% of the staff use it in nutrition against 36% in phytotherapy (figure 6). A very high proportion of the population obtains its supplies in urban areas (68%), compared to 19% in market gardening sites, and 13% in remote fields (figure 7).

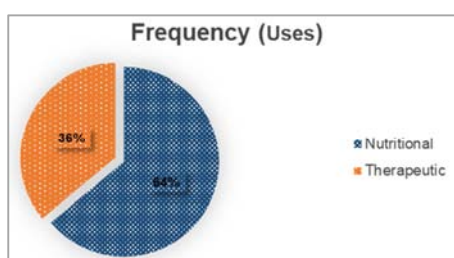


Figure 6. Uses of *Vernonia amygdalina*.

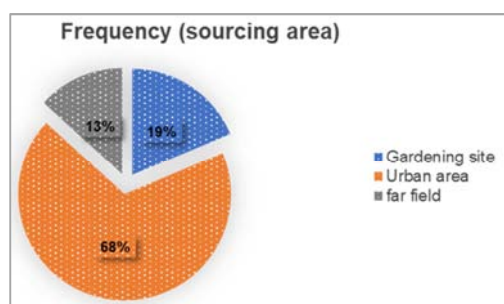


Figure 7. *Vernonia amygdalina* Sourcing Area.

The leaves of *Vernonia amygdalina* are very little known in phytotherapy according to the survey conducted among herbalists. The results of the survey carried out among the population confirm this. 35% claim to have no idea of its use in the treatment of pathologies, 21% use it to treat intestinal affections, 18% use it to treat malaria, 13% to treat oral affections, 12% for other unspecified pathologies and only 1% for the treatment of hepatic affections (figure 8).

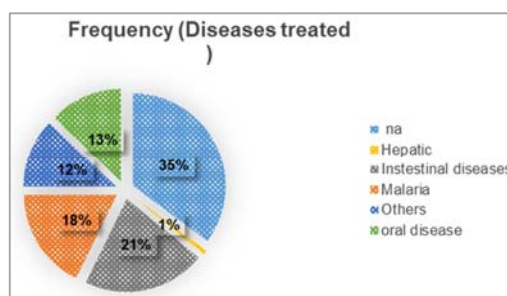


Figure 8. Diseases treated with *Vernonia amygdalina*.

The frequency of use in nutrition and herbal medicine shows the same trends. Twice-weekly use is preferred in both cases, followed by once a week (Figures 9 and 10).

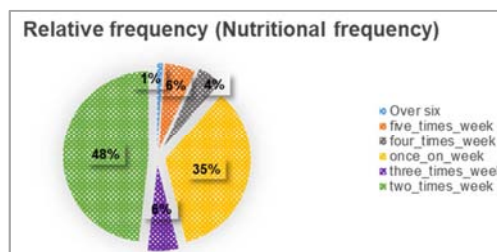


Figure 9. Use of *Vernonia amygdalina* in nutrition.

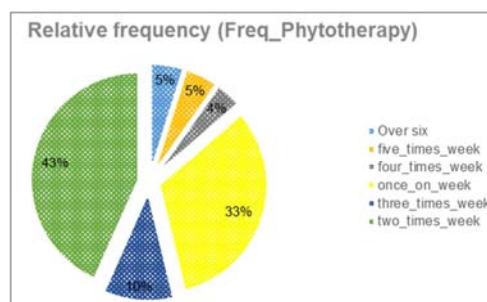


Figure 10. Use of *Vernonia amygdalina* in phytotherapy.

## 4. Discussion

The ethnobotanical survey of herbalists has shown that roots are more appropriate in recipes than other parts of the plant. These results are contrary to those of [5] who showed that leaves are cited more than other plant organs. The best represented family is that of Rubiaceae. [16] showed that the best represented families in the treatment of liver diseases are Asteraceae, Euphorbiaceae and Fabaceae. Many medicinal plants are mentioned only once. *Bridelia ferruginea* is the most representative 11.90%. The organ harvested is the root. [17] showed that the leaves of *Bridelia ferruginea* are hepatoprotectors in second position after the leaves of *Vernonia amygdalina*. During his survey on the use and effect of herbal medicines in patients suffering from liver diseases hospitalized at the Department of Medicine and Hepatogastroenterology of the University Hospital Center (CHU) of Cocody in Côte d'Ivoire [16] showed that the leaves of *Vernonia amygdalina* are cited among the most widely used medicinal plants. [18] conducted a census of medicinal plants that fight liver diseases across Africa. *Morinda lucida* is cited in many African countries as a medicinal plant used in the traditional treatment of liver diseases. It is one of the nine most representative plant species in our study. *Cochlospermum tintorium* of the family Cochlospermaceae; *Entada africana* of the family Mimosaceae; *Combretum micranthum* of the family Combretaceae were cited in the work of [19] as medicinal plants used in the traditional treatment of hepatitis B in Mali. [20, 21] showed that *Desmodium adscendens* of the Fabaceae family, *Phyllanthus amarus* of the Euphorbiaceae family have anti-hepatotoxic activities. Several plant species are cited as anti-hepatotoxic in different countries. Plants whose leaves are effective in the prevention and treatment of hepatitis must be favoured in order to perpetuate rare species. The leaves of *Vernonia amygdalina* are confirmed by the work of [9] as anti-hepatotoxic. The population lacks information about its potential in phytotherapy. A management of popularization is important for the knowledge of *Vernonia amygdalina* for its therapeutic virtues. The supply sites must be air-conditioned in order to limit the risks of contamination by toxic metals which can hinder their effectiveness. A large proportion of the population obtains its supplies in built-up areas, but roadsides must be avoided to limit the risk of contamination by toxic metals. The work of [22] showed that the leaves of *Vernonia amygdalina* are contaminated by toxic metals on market gardening sites like other vegetables. Food products from urban areas are not spared by this contamination as confirmed by the work of [23] in the province of Katanga in DR Congo. The frequency of use must be reviewed in the case of treatment of pathologies in order to guarantee a cure without negative impact depending on the dose.

## 5. Conclusion

The ethnobotanical survey has allowed to take stock of the knowledge of *Vernonia amygdalina* in nutrition,

phytotherapy and places of supply. The plant is very little known in phytotherapy and by the population in the treatment of liver diseases. All looks and recipes are oriented towards the sensitive parts (roots and bark) of rare medicinal plants that are not easy to cultivate. This allows a speculation of recipes with herbalists. A management must be made for the popularization of these medicinal plants easy to reproduce in order to redirect the eyes of the population and facilitate the conservation of the flora. Supply sites such as market gardening sites and towns occupy an important place. Therefore, monitoring is necessary for the reasonable use of inputs, compost and other soils that can increase the contamination of plants by toxic metals.

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