

**VALORISATION OF PLANT RESOURCES USED IN ALTERNATIVE MEDICINE IN
THE TREATMENT OF LIVER DISEASES IN SOUTH BENIN:
ETHNOPHARMACOLOGICAL CONTRIBUTION****SACRAMENTO T. Isabelle*¹, GUINNIN F. D. Félix², SANGARE Maxime Machioud², ATEGBO Jean-Marc²**¹National University of Agriculture (UNA/Kétou) School of Management and Operation of Livestock Systems 01 BP 55 Porto-Novo.²Department of Animal Physiology, Laboratory of Animal Physiology, University of Abomey-Calavi 06 BP 2584 Cotonou (Benin).***Corresponding Author: Sacramento Tèniola Isabelle**

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ABSTRACT

Ethnobotanical prospecting was carried out on plants used in alternative medicine in the treatment of liver diseases in the communes of Kétou and Zagnanado in South Benin. The main objective of this study is to list the hepatoprotective medicinal plant resources of South Benin in order to valorize them. In the course of this study, a comparison of the results with those of the bibliographical data concerning the use of plants in the treatment of hepatic diseases was carried out. At the end of the study, 53 plants were listed with their modes of use. Different organs of: *Acanthospermum hispidum*, *Bridelia ferruginia*, *Combretum micrantum*, *Passiflora foetida* are widely used by traditional practitioners in South Benin in the treatment of liver diseases. Phyto-biochemical and pharmacological studies will enable us to develop these medicinal plants.

KEYWORDS: Ethnopharmacology, hepatoprotective plants, traditional practitioners, South Benin.**INTRODUCTION**

Liver diseases are recurrent pathologies and constitute a real public health problem affecting both developed and developing countries. According to a WHO estimate, about 80% of African populations use traditional medicines to meet their primary health care needs (WHO Strategy, 2002). Thus, primary health care is largely dependent on medicinal plants and associated local knowledge (Fyhrquist, 2007). It is important to conduct ethnopharmacological studies to identify local uses of plant species (Betti, 2004).

There has been some work in the sub-region and in Benin on hepatoprotective medicinal plants, the most recent of which are those of Sangaré et al., 2012 and Guinnin et al., 2015. People use plant drugs without any scientific knowledge of the immediate, medium or long-term undesirable or even toxic effects, or of the pharmacodynamic properties of the active substances contained in them (Gupta et al., 2005). In this context, plants presumed to have beneficial effects on health, according to endogenous knowledge, should be the subject of in-depth pharmacological studies.

This prospective study is in line with the development of natural resources and could provide information on potential plants used as alternative medicine in the

treatment of liver diseases in South Benin. Benin has a great floristic biodiversity, in addition to a centuries-old tradition of therapy with numerous plants considered to have hepatoprotective properties. Experience has shown that the richness of plant biodiversity and the knowledge of our therapists can help improve the treatment of diseases by opening up new scientific avenues for their treatment (Toukara, 2008). A lot of efforts are being made nowadays to discover new actively therapeutic molecules of natural origin. Medicinal plants present themselves as an alternative for the research of these new active and therapeutic molecules.

MATERIAL AND METHODS

The ethnopharmacological survey was conducted on medicinal plants used by traditional practitioners in the treatment of liver diseases in South Benin. The questionnaire method was used to obtain the latest information on these medicinal plants. The approach used was the semi-direct or semi-structured interview. The identification of plant material was done using the Analytic flora of Benin (Akoègninou et al., 2006) and the species selected for in-depth pharmacological studies were then certified at the Herbar National du Bénin at the University of Abomey-Calavi (UAC), Benin.

Choice of localities, characteristics, setting and study population

The study took place from 26 August to 08 September 2019 in some districts of the communes of Kétou and Zagnanado. The parameters that justified our choices were the accessibility to information, the ease of

communication, the number of tradi-therapists, demographics and their diverse geographical areas. The Districts prospected are located between 7° 10' 00" and 7° 41' 08" of North Latitude and 2° 22' 03" and 2° 37' 41" of East Longitude and the communes are in the Plateau and Zou departments as shown in Figure 1.

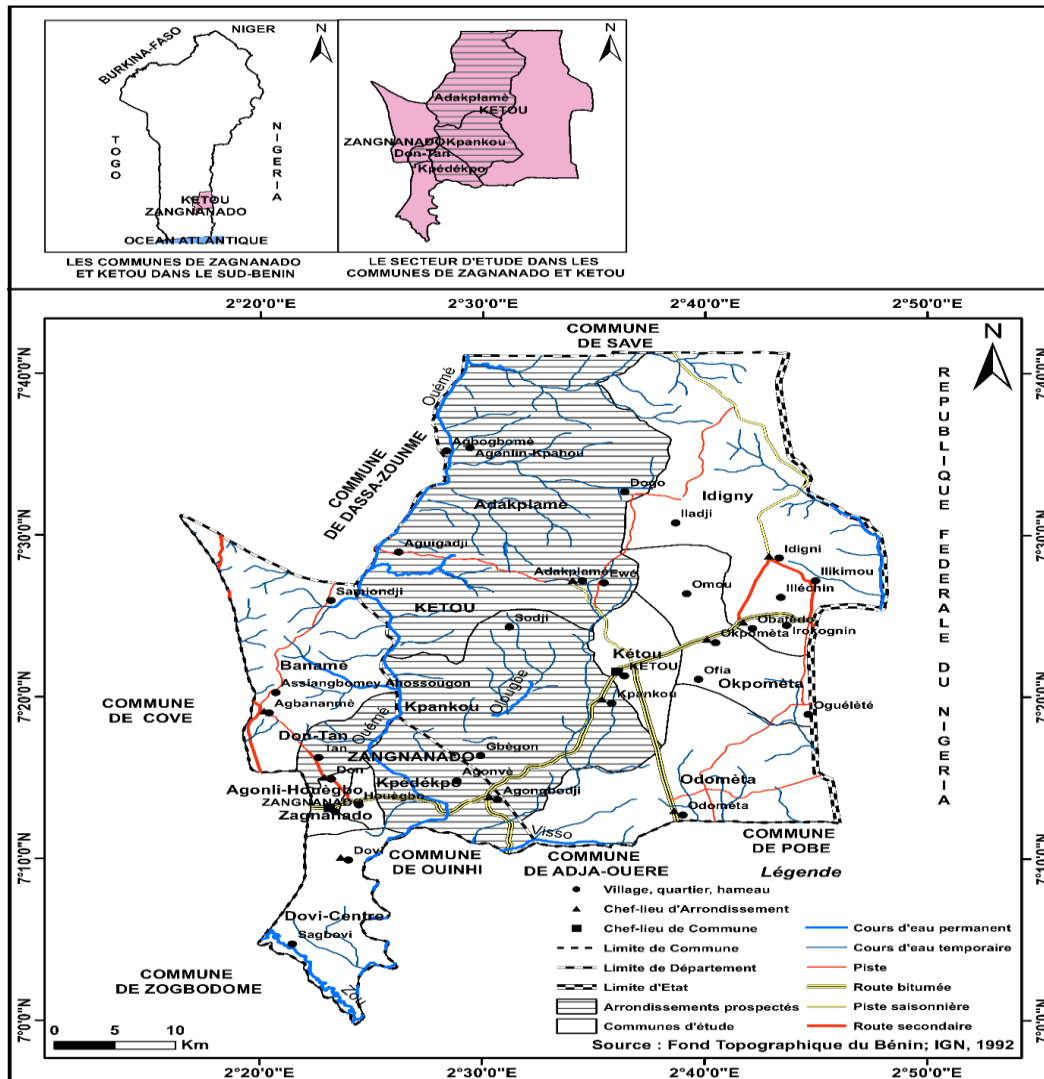


Figure 1: Localities surveyed during the study.

Surveys

The ethnopharmacological survey was carried out among 55 traditional practitioners in the presence of indigenous guides who knew both the language of the area and the plants. An individual interview was first conducted with the tradipractors who were available and who agreed to answer the questions from the interview guide. A second visit was made to most of them to assess the reliability of the information obtained from the interview. The survey tools consisted of a questionnaire and a thematic interview guide. During the survey, the information collected concerned the profile of the resource persons (age, sex, level of education) and ethnopharmacological data such as local names of species, parts of plants used, methods of preparation and use, routes of administration, dosage, prohibitions and side effects where known,

frequency of administration and duration of treatment. The identity of the practitioner, the average number of patients treated monthly and their professional experience were not excluded during the interview. During the interviews, we also assessed the skills of these traditional therapists in the treatment of liver diseases. This anthropological approach made it possible to gather information on the plants used.

Statistical analysis of the results

Data analysis was carried out as follows: decoding of the survey forms after processing and statistical analysis of the results. Thus, the responses to the questionnaires were analysed, decoded, entered and processed using the EXCEL 2013 spreadsheet. The citation frequency (F_c) of each plant was determined by the following formula:

$$Fc = \frac{Nc}{Nt} \times 100$$

where Nc is the number of citations of the plant in question and Nt is the total number of citations of all plants.

RESULTS

The survey covered 55 male practitioners of traditional therapy, including 47 traditional healers (85.45%), all male, and 8 herbalists (14.55%), all male (Figures 2 and 4). From this survey, we note that almost all of the traditional healers surveyed have a good knowledge of medicinal plants with hepatoprotective properties. This observation is all the more true since the prospecting took place in rural areas. In particular, the traditional treatment applied by most of the traditional practitioners prospected is sympathetic. The youngest of the tradipractors surveyed was 34 years old and the oldest was 80 years old. The number of years of professional experience varied between 05 and 55 years (Figure 6).

Of the 55 surveyed traditional therapists 12.73% are under 40 years old, 80% are between 40 and 70 years old, and 07.27% are over 70 years old (Figure 3). The majority of traditional therapists are analphabets, approximately sixty-seven percent (67.27%) (Figure 5). Different parts of medicinal plants are used in the preparation of traditional medicines namely leaves, bark, root, whole plant, leafy stem, fruits (Table I and Figure 8) with a preference for leaves (69.81%) and leafy stems (9.43%). Here bark comes last with 1.89%. Different methods of preparation are listed: decoction (43.39%), infusion (15.09%), maceration (24.52%), calcination (05.66%), spraying (07.54%) and crushing (03.77%) (Figure 7). At the end of this ethnopharmacological survey, a repertoire of 53 plant species used in the treatment of liver diseases was compiled (Table 1). These medicinal plants are grouped into forty-nine (47) genera and belong to thirty-one (31) botanical families, the most represented being the Euphorbiaceae (Table II). The figures and tables are presented as follows:

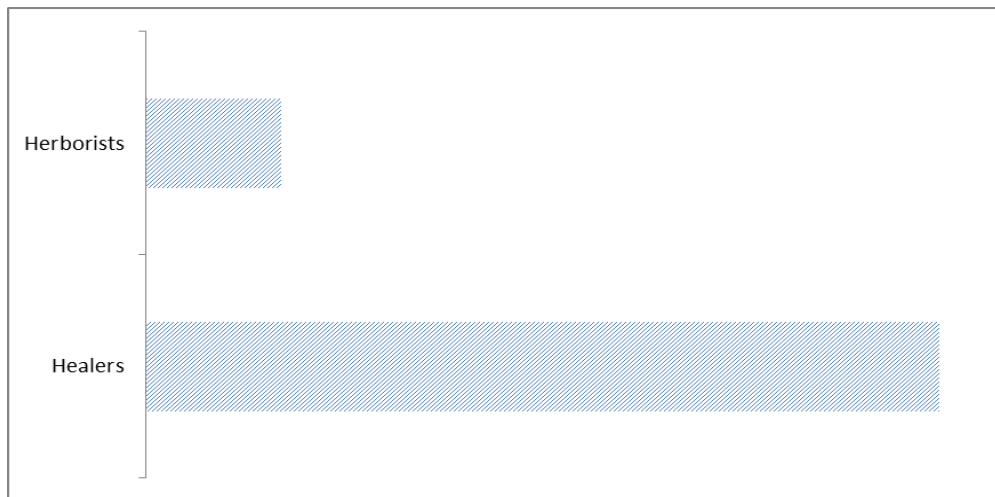


Figure 2: Distribution of respondents by occupational class.

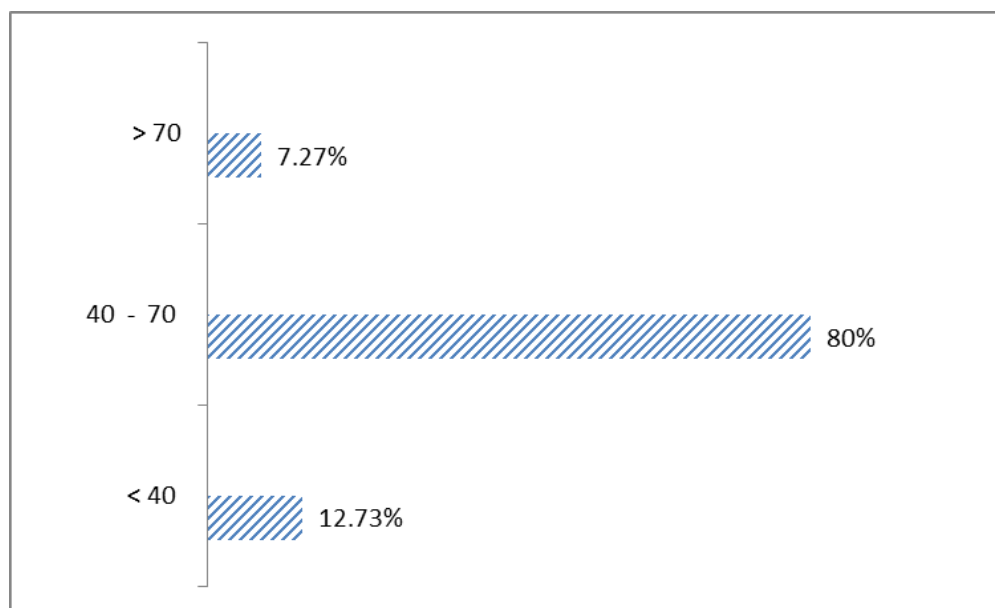


Figure 3: Distribution of respondents according to age groups.

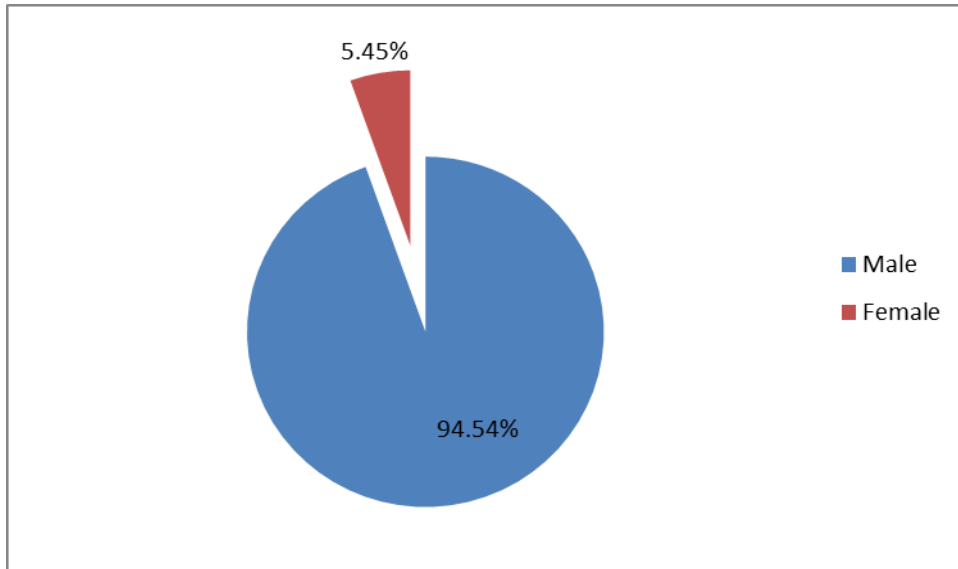


Figure 4: Distribution of respondents by gender.



Figure 5: Distribution of respondents by education level.

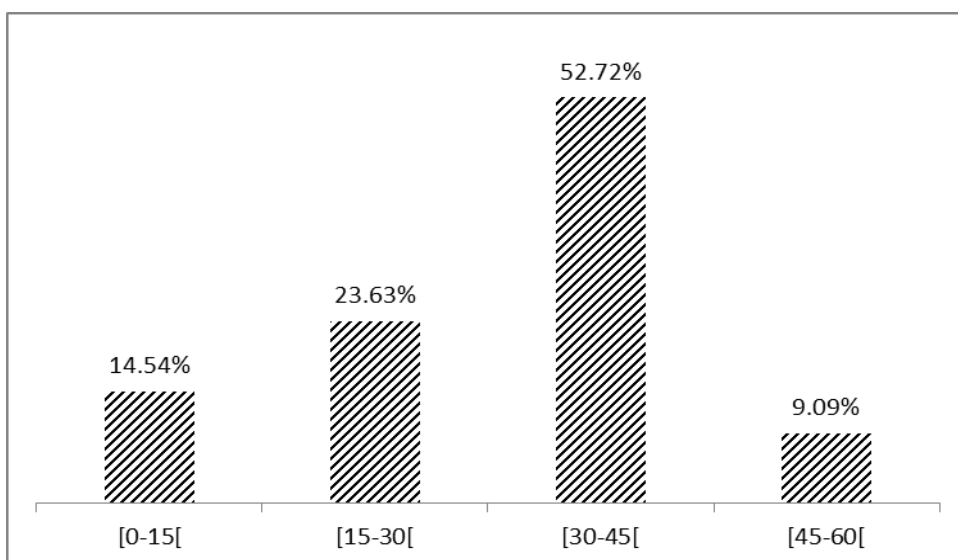


Figure 6: Distribution of respondents by professional experience.

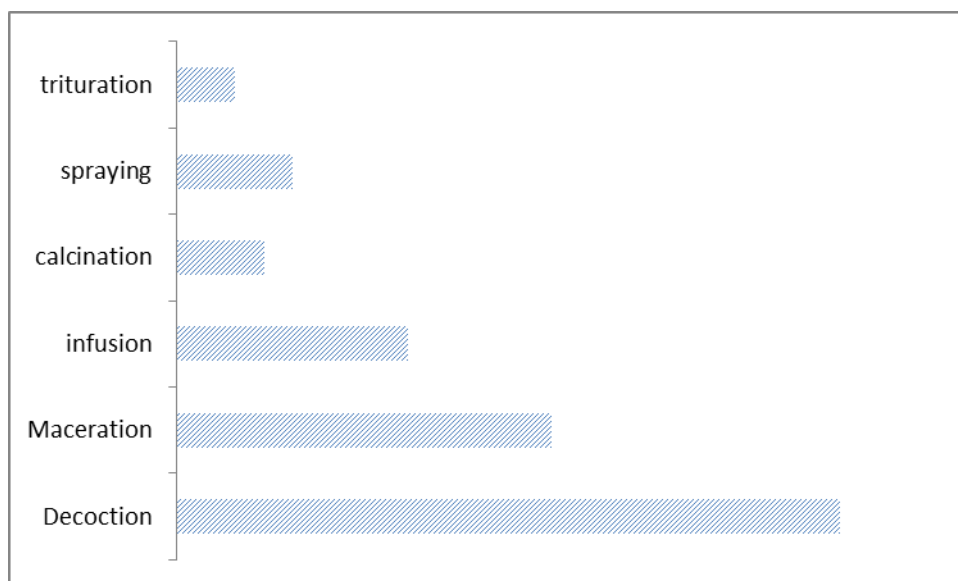


Figure 7: Modes of preparation of medicines for traditional treatment of liver diseases.

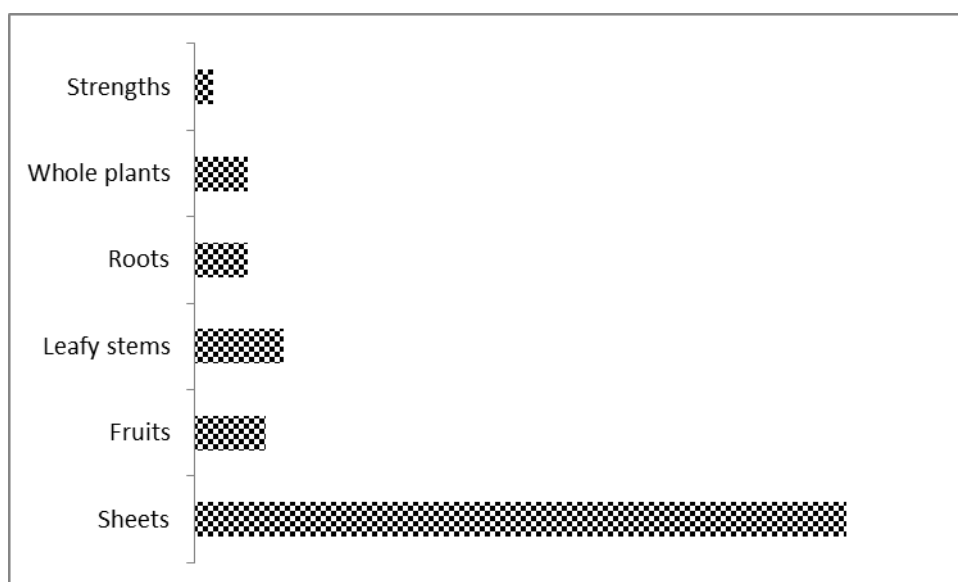


Figure 8: Plant organs used for the treatment of liver diseases.

Table I: Plants used by traditional practitioners in South Benin for the treatment of liver diseases.

Species	Botanical Families	Vernacular Names (Mahi or Fon)	Organs used	Citation frequency (%)
<i>Acacia sieberiana</i>	Mimosaceae	Aduwɛ	Sheets	0,4
<i>Acanthospermum hispidum</i>	Asteracea	Kponomi	Sheets	4,82
<i>Aloe buetneri</i>	Liliaceae	Zogah	Sheets	2,00
<i>Ananas comosus</i>	Bombacaceae	Agondé	Fruits	2,20
<i>Amaranthus spinosus</i>	Amaranthaceae	Tètè wunon	Leafy stems	01,00
<i>Aspilia africana</i>	Asteraceae	Fonxwènkán	Sheets	01,60
<i>Azadirachta indica</i>	Meliaceae	Kininutin	Sheets	0,80
<i>Boerhavia diffusa</i>	Nyctaginaceae	Afokpadinwa	Racine	0,18

<i>Bridelia micrantha</i>	Euphorbiaceae	Hongogwi	Roots	01,40
<i>Bridelia ferruginia</i>	Euphorbiaceae	Honsukokwe	Root, Leaves	05,44
<i>Calotropis procera</i>	Asclepiadaceae	Kpentwɛ	Sheets	0,80
<i>Canana indica</i>	Cannaceae	Agbotokwin	Sheets	1,61
<i>Cardiospermum halicabum</i>	Sapindaceae	Togba	Sheets	01,28
<i>Carica papaya</i>	Caricaceae	Jikpɛn	Fruits	02,20
<i>Cassia occidentalis</i>	Caesalpiniaceae	Sɛnanwanmi	Sheets	0,60
<i>Chassalia kolly</i>	Rubiaceae	Atindjɛ	Sheets	0,80
<i>Citrus aurantifolia</i>	Rutaceae	Klé	Fruits	03,21
<i>Coclospermum tinctoriom</i>	Cochlospermaceae	Atinyi vokanfun	Sheets	0,80
<i>Coclospermum planchonii</i>	Cochlospermaceae	Ajinaku vokanfun	Sheets	01,40
<i>Cocos nucifer</i>	Arecaceae	Agonkɛ	Fruits	0,60
<i>Combretum micranthum</i>	Combretaceae	Kinikiniba	Sheets	05,02
<i>Clausena anisate</i>	Rutaceae	Gbozozwe	Sheets	01,40
<i>Eugenia aromatica</i>	Myrtaceae	Atinkɛn gbadota	Sheets	01,60
<i>Euphorbia hirta</i>	Euphorbiaceae	Nonsiwé	Sheets	01,80
<i>Euphorbi kamerunica</i>	Euphorbiaceae	Sélo	Sheets	01,40
<i>Gardenia ternifolia</i>	Rubaceae	Dakpla asu	Sheets	01,60
<i>Jatropha curcas</i>	Euphorbiaceae	Nyipkotin	Sheets	0,20
<i>Kigelia africana</i>	Bignoniaceae	Nyablikpo	Sheets	03,41
<i>Moringa oleifera</i>	Moringaceae	Kpatin	Leafy stem	03,61
<i>Myrianthus arboreus</i>	Moraceae	Toweto	Sheets	02
<i>Nauclea latifolia</i>	Rubiaceae	Agbosido	Sheets	01,60
<i>Nicotiana tabacum</i>	Solanaceae	Azowiwi	Leafy stem	0,80
<i>Ocimum Canum</i>	Oleaceae	Késu késu	Sheets	0,20
<i>Ocimum gratissimum</i>	Oleaceae	Xɛbioso	Sheets	03,21
<i>Olyra latifolia</i>	Gramineae	Amiolo	Sheets	01,00
<i>Opilia celtidifolia</i>	Opiliaceae	Twahantumu	Sheets	0,80
<i>Parkia biglobosa</i>	Mimosaceae	Ahwatin	Sheets	0,60
<i>Parquetina nigrescens</i>	Periplocaeeae	Asogbokan	Sheets	01,4

<i>Parinari curatellifolia</i>	Rosaceae	Kotama	Sheets	00,80
<i>Passiflora foetida</i>	Passifloraceae	Avun nyEn mi trwi	Sheets	04,41
<i>Phyllanthus amarus</i>	Euphorbiaceae	HlEnlEnwE	Leafy stem	03,82
<i>Phyllantus pentandus</i>	Euphorbiaceae	HlEn vo	Bark	01,80
<i>Phyllantus discoideus</i>	Euphorbiaceae	HlEnwE	Sheets	03,41
<i>Phyllantus ninuri</i>	Euphorbiaceae	HlEnwE	Whole plant	03,21
<i>Piliostigma reticulatum</i>	Caesalpiniaceae	Klonlonma	Sheets	03,21
<i>Polycarpaea linearifolia</i>	Caryophyllaceae	Amonritana	Sheets	01,00
<i>Raphia sudanica</i>	Areaceae	Mwetin	Leafy stem	02,20
<i>Sapium grahami</i>	Euphorbiaceae	Dobogo	Sheets	01,00
<i>Terminalia albida</i>	Combretaceae	Idi	Whole plant	0,80
<i>Terminalia glaucescens</i>	Combretaceae	Alotun	Sheets	02,00
<i>Tetrapleura tetraptera</i>	Mimosaceae	LEnja	Whole plant	01,40
<i>Uvaria chamae</i>	Annonaceae	Agbanan	Sheets	01,40
<i>Vernonia amygdalina</i>	Asteraceae	Amavivè	Sheets	03,82

Table II: Frequency of botanical families of the plant species surveyed.

Botanical Families	Frequency (%)
Amaranthaceae	1,85
Annonaceae	1,85
Areaceae	5,55
Asclepiadaceae	1,85
Asteraceae	3,70
Bignoniaceae	1,85
Bromeliaceae	1,85
Caesalpiniaceae	3,70
Cannaceae	1,85
Caricaceae	1,85
Caryophyllaceae	1,85
Cochlospermaceae	3,7
Euphorbiaceae	1,852
Gramineae	1,85
Liliaceae	1,85
Meliaceae	1,85
Mimosaceae	5,55
Moraceae	1,85
Moringaceae	1,85
Myrtaceae	1,85
Nyctaginaceae	1,85
Oleaceae	1,85
Opiliaceae	1,85
Passifloraceae	1,85
Periplocaceae	1,85
Rosaceae	1,85
Ribuaceae	1,85

Rubiaceae	5,55
Rutaceae	3,70
Sapindaceae	1,85
Solanaceae	1,85

DISCUSSION

The results show that among traditional practitioners, there are several professional classes including herbalists and traditional healers. The latter usually consult at home or rarely in their private practices, whereas most herbalists can be found in the markets. Considering the age groups of the respondents, we can say that in Benin it is people of a certain age who hold the traditional knowledge about medicinal plants. Moreover, the medicinal virtues of plants are ancestral knowledge that is passed on from generation to generation (Klotoé *et al.*; 2013; Dassou *et al.*, 2014). These results show that knowledge about traditional medicinal plants is transmitted from ascendants (wise) to descendants (young) in such a way that both types of individuals have practically the same level of knowledge at a given time (Dassou *et al.*, 2014). This is all the more justifiable as the majority of traditional practitioners have reported inheriting their knowledge, which is confirmed by the work of Tamboura *et al.*, 1998 which have shown that traditional ethnomedicine is a science of society whose content remains a family heritage. Approximately 67.27% of the respondents are illiterate. Our results confirm the national data; indeed, according to Benin's fourth national report on biological diversity, rural populations, the majority of whom are illiterate, are the holders of medicinal knowledge of plants (UNDP Benin, 2009).

Among the species recorded, the botanical family most represented is that of Euphorbiaceae. These results are close to those of Sangare *et al.* (2012) who made a similar study on hepatoprotective plants and the traditional use of *Gomphrena celosioides* Mart. in Benin in the treatment of this pathology. It also corroborates the work of Guinnin *et al.* (2015) who showed that the family Euphorbiaceae is widely represented among hepatoprotective plants. The therapeutic uses of the listed species are in line with the observations made by Valnet (2001) and Chevallier (2007). After calculating citation frequencies, 04 plants were selected for further investigation because they are plants with a more or less high citation frequency on which very few studies have been carried out. These are *Acanthospermum hispidum* of the Asteraceae family, *Bridelia ferruginia* of the Euphorbiaceae family, *Combretum micranthum* of the Combretaceae family and *Passiflora foetida* of the Passifloraceae family. These results are close to those of Ouattara (2006) who finds that liver diseases are one of the most treated pathologies after malaria. Leaves are the organs mainly used for drug preparations. These results are similar to those of Guinnin *et al.* (2015) who find that leaves are used mostly during traditional treatments. This is also what Ambe *et al.* (2015) reveal through a study on the diversity of medicinal plants used in the traditional

treatment of diarrhea in Abidjan markets. According to this study, leaves are the most commonly used parts with 28%, followed by bark and leafy stems with 23% and 22.5% respectively (AMBE *et al.*, 2015). However, these results are different from those of Thirumalai *et al.* (2012) who, in a similar study on diabetes in India, found that the part of the plant most used is the leafy stem. This difference is understandable as the pathology concerned and the geographical area of study are different.

The way medicinal plant potions are prepared varies according to socio-cultural groups. The decoction (43.39%) is the mode most used by traditional practitioners. These results are similar to those of Dougnon *et al.* (2018) who indicate that the recipes used by herbalists in South Benin in the treatment of typhoid fever are essentially prepared by decoction. This is also the observation made by Bio *et al.* (2016), who showed that in the context of the treatment of hypertension with medicinal plants in Benin, decoction is the most frequent method of preparation (80.35%).

CONCLUSION

At the end of this study, we note that traditional practitioners in the communes of Kétou and Zagnanado in South Benin have a good knowledge of hepatoprotective plants. This knowledge must be verified by scientific work on the biological activities (pharmacodynamics and pharmacokinetics) of these plants and especially on their toxicity and the possible interactions of their different components. It is therefore important to carry out biochemical and pharmacological studies on the selected medicinal plants in order to enhance their value.

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