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Ethnic knowledge in food, medicinal and economic value of Cochlospermum spp. root powder in Sudanian zone of Benin

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Cochlospermum spp. is a multipurpose species used widely in West Africa by local communities. The present study focused on ethnic knowledge in food, medicinal and economic value of *Cochlospermum* spp. root powder in Sudanian zone of Benin. From nine (9) ethnic groups, 86 key informants and 90 processors of *Cochlospermum* spp. root were interviewed in the study area using semi-structured questionnaires. Additionally, 36 focus group discussions were conducted each gathering 8-10 women of reproductive age selected on a voluntary basis. A generalized linear model (GLM) was used to investigate the effect of socio-demographic characteristics of the survey population on food and medicinal use value of *Cochlospermum* spp. root powder. Kruskal Wallis test was carried out to highlight differences between phytodistricts and ethnic groups with regards to the brut monthly income of processors. From all respondents in the study area, thirteen (13) food uses and fourteen (14) medicinal uses were identified for *Cochlospermum* spp. root powder. Ethnic differences are only observed for food uses. Respondents from Peulh and Waama ethnic groups have the highest food use value, which were on average 6.02 and 5.96 uses respectively, while respondents from Gourmantché ethnic group have the lowest food use value (1.01 uses). Monthly income generated while processing *Cochlospermum* spp. root was highest for Bariba (40,675 FCFA) and lowest for Boo (16,891 FCFA). Local people livelihoods can be improved if the species is better managed and valorized. Nevertheless, studies are needed to facilitate the domestication of the species.

Keywords: Use value, ethnic groups, health, food security, income-generating activity

INTRODUCTION

Malnutrition in all its forms remains one of the most serious public health problems in the world (Das et al., 2013; Gebremichael et al., 2018). It includes undernutrition with fetal growth restriction, suboptimum breast feeding, stunting, wasting and micronutrients deficiencies especially iron, vitamin A and zinc (Black et al., 2013). Micronutrient deficiencies, a less visible form of undernutrition, are endemic (Wieser et al., 2017). They affect an estimated 2 billion people, in particular women and children under 5 years worldwide (Bailey et al., 2015; Kassebaum et al., 2014; Saini et al., 2014). Among these micronutrients deficiencies, iron and zinc deficiencies are the most prevalent (Bailey et al., 2015; Das et al., 2013). They may impaired cognitive and physical development and further contribute to higher morbidity and mortality rates (Wieser et al., 2017). Although these micronutrients deficiencies occur worldwide, 80% of the cases are recorded in sub-Saharan Africa (Ohanenye et al., 2021).

In Benin, iron deficiency is the most reported form of micronutrient deficiency. According with EDS (2018), 72% of under five years old children and 58% of pregnant women are anemic, possibly due to iron deficiencies. Food fortification is considered as the most appropriate preventive approach against micronutrient deficiencies (Bhagwat et al., 2014; Method and Tulchinsky, 2015). Nevertheless, classical food fortification is mostly unsustainable because of the low availability of the classical food fortificant and the low purchase power of those who need it (Chadare et al., 2019). In such a context, the use of nutritious local resources that are already integrated in the food habit of population is a good alternative for food-to-food-fortification. Food-to-food fortification is an approach that uses an interesting (contain useful amounts of micronutrients), available, and accessible local resource (plant or animal) to fortify another food (Uvere et al., 2010).

Preliminary studies identified Cochlospermum spp. root powder as a good source of micronutrients (Affonfere, 2018; Affonfere et al., 2021; Ayosso, 2016). Many studies investigated the medicinal properties of this species (Amubode, 1991; Inngjerdingen et al., 2014; Inngjerdingen et al., 2013). It is commonly believed that Cochlospermum spp. root powder can contribute to alleviate undernutrition. Nevertheless, there is a lack of documented knowledge on food and medicinal uses of this species in Benin while traditional knowledge and practices on foods are useful to develop new foods (Prakash, 2016). These new foods will contribute to feed the population in the context of the increase of world demography coupled with the depletion of natural resources (Mawunu et al., 2020). Such food and medicinal knowledge depends on numerous factors, which are prerequisite for making management decisions (Goudégnon et al., 2017). Considering those factors when compiling food and medicinal knowledge is necessary to among others, (i) capture the largest possible range of uses of the species, but also (ii) design valorization and sustainable uses plans that include social group differences. Among these determining factors, the ethnic group is often cited (Akpovo and Fandohan, 2021; Assogba et al., 2017; Fandohan et al., 2017; Goudégnon et al., 2017). Differences among ethnic groups suppose that each ethnic group has specific need (Assogba et al., 2017) and food practices are usually cultural (Abdullah et al., 2016; Chadare et al., 2008). Therefore, this research aims at documenting the ethno-food and ethno-medicinal knowledge related to Cochlospermum spp. root powder in Benin.

MATERIAL AND METHODS

Survey area

The study was carried out in the Sudanian Climatic Zone (SCZ) of Benin republic. Among the three climatic zones of Benin, the SCZ is located in the Northern part and hosts naturally Cochlospermum spp. (Akoègninou et al., 2006). Based on a meso-scale analysis of vegetation, soil and climatic conditions, the SCZ has been sub-divided into tree (3) phyto-districts: Northern Borgou, Atacora chain and Mékrou Pendjari (Adomou, 2005). It encompasses mainly Ditamari, Berba, Warma, Gurma, Natimba ethnic groups and their major socio-economic activities are

pastoralism, agriculture, trader and agribusiness (Assogbadjo et al., 2005; Gandji et al., 2018). Each phyto-district hosts various ethnic groups and members of the same ethnic group are sometimes historically dispersed across different phyto-districts. However, even if people belonging to the same ethnic group are settled in different locations, they share together traditions, historical experiences, perceptions, values, attitudes, beliefs and language (Ekué et al., 2010). Therefore, one may expect some variability on uses of natural resources and subsequent know-how not only among ethnic groups, but also among gender group (Ekué et al., 2010). According to the above-mentioned considerations and in order to get the maximum of information, nine (9) municipalities distributed in the three (3) phyto-districts (Figure 1) were included in the survey. The selected localities and villages in each of the three (3) phyto-districts as well as the encountered ethnic groups are presented in table 1.

Sampling of respondents

The survey was conducted among key informants, processors of Cochlospermum spp. root powder and women of reproductive age (for focus group discussions). For each selected munipalities, two (2) villages were targeted for data collection (Table 1).

Focus group discussion

Four (4) focus group discussions (FGD) were set per municipality (2 FGD per village). The focus group targeted especially mothers of under five years old children. A total of 36 FGDs were conducted, gathering 8 to 10 volunteer participants each. In total, 309 women of reproductive age participated in the FGD.

Cochlospermum spp. root powder processors

ten (10) Cochlospermum spp. root powder processors were randomly selected per municipality (5 processors per village) on a voluntary basis and a total of 90 processors were interviewed in the three phyto-districts.

Key informants

Ten (10) key informants were randomly selected per municipality (5 key informants per village). They were processors (identified during the interviews with the processors), traders (identified during the FGDs), experienced consumers (identified during the FGDs) and persons from institutions (Nutritional Rehabilitation Centre, Social Promotion Centre…) and experienced mothers/fathers. They were selected on a voluntary basis. A total of 86 key informants were interviewed.

Data collection

Field data were collected from December 2020 to February 2021 on ethno-food and ethno-medicinal knowledge relative to Cochlospermum spp. root powder. Questionnaires used were tested with local inhabitants prior to the formal field survey, and adjusted accordingly. Discussions were conducted in the selected villages in local languages that were best understood by the informants. Information collected during the survey were related to food and medicinal uses of Cochlospermum spp. root powder, association of Cochlospermum spp. root powder with other food ingredients, foods derived products from Cochlospermum spp. root powder, the traditional processing methods of Cochlospermum spp. root, the different packaging for Cochlospermum spp. root powder with the different conservation techniques, the selling price in FCFA (per Kg) of Cochlospermum spp. root powder as well as the quantity sold per month. The processing activity of Cochlospermum spp. root is carried out year-round by women in the study area.

Data processing

The data collected are recorded in an Access database and analyses were carried out in Excel and R statistic software version 4.0.2 (RCoreTeam, 2020). A distribution of the respondents was made according to the phyto-district. It was done by ethnic group, age category (3 age categories as described by Assogbadjo et al., (2008), sex, main activity and level of education. The socio-demographic characteristics of the respondents were described by calculating the relative frequencies (RF, %). Knowledge on the food and medicinal uses of Cochlospermum spp. was assessed by calculating the relative citation frequencies (RFC, %) and the use value. Relative citation frequencies (RFC, %) was also used to evaluate food and medicinal diversity according to the phyto-district (Equation 1).

RFC= FC/N*100 (equation 1)

With FC the number of respondents who cited a given specific use and N: total number of respondents.

The use value (total) and by use category (food and medicinal) was calculated according to the socio-demographic characteristics of respondents using the approach of Gomez-Beloz (2002). A generalized linear model (GLM) with Poisson family and extension was used to study the effect of socio-demographic characteristics (phyto-district, age category, sex, ethnic group, occupation and level of education) of the respondents on use values in MASS (Venables and Ripley, 2002) and PSCL (Jackman, 2020). The overall model has been simplified after testing all specific models. The best model was selected using the “Akaike Information Criterion” (AIC) (model with the lowest AIC value). The relative citation frequencies of the storage modes of Cochlospermum spp. root powder were calculated. The rank, mean and coefficient of variation of the price per Kg of Cochlospermum spp. root powder and the brut monthly income (FCFA/per processor) were calculated by phyto-district and ethnic group (most significant factors). The coefficient of variation (%) was calculated to measure the variability of each variable. Once the difference was identified after a Kruskal Wallis test (non-normally distributed data), the Nemenyi post-hoc test (in PMCMR package) was carried out to highlight the differences in phyto-district and ethnic group with respect to price and brut monthly income.

RESULTS

Socio-demographic characteristics of the respondents

Table 2 shows the socio-demographic characteristics of key informants and processors according to phyto-districts. In each of the three phyto-districts, the key informants involve men and women in an equal proportion except in Atacora chain where men were less represented (23.1%). The adults are the most represented among the key informants in each of the three phyto-districts followed by the old people. The most represented ethnic groups within the key informants are Peulh (67.7 %) and Bariba (16.3%) in Northern Borgou, Waama (42.31 %), Gourmantché (30.8 %) and Bariba (15.4 %) in Atacora chain and Dendi (37.9 %), Bariba (31.0 %) and Waama (13.79%) in Mékrou Pendjari. Other ethnic groups such as Boo, Natimba, Otamari, and Biali are also encountered among key informants. Most of the key informants (> 60 %) are farmers or householders without any formal education level regardless of phyto-district. The production of Cochlospermum spp. root powder is especially performed by women in each of the three (3) phyto-districts. In Northern Borgou and Atacora chain, the processors are adult (51.8% and 65% respectively) and young (48.1 % and 20% respectively) while in Mékrou-Pendjari the processors are especially adult persons (90.5 %) (Table 2). Processors are Peulh (63.0 %) and Boo (37.0%) in Northern Borgou, Waama (100 %) in Atacora chain and Waama (42.9 %), Dendi (38.1 %) and Bariba (19.0 %) in Mékrou Pendjari. Most of the processors interviewed (≥ 85%) have as main activity the production of Cochlospermum spp. root powder regardless of phyto-district (Table 2).

Traditional knowledge on Cochlospermum spp. root powder

Table 3 shows the diversity of specific food and medicinal uses of Cochlospermum spp. root powder according to the phyto-districts (Northern Borgou, Atacora Chain and Mékrou Pendjari). The specific food uses of Cochlospermum spp. root powder concern the use of Cochlospermum spp. root powder to enrich sauces or as food colorants. According to respondents, the use of Cochlospermum spp. root powder gives a red color (like tomato) to sauces which increases the acceptability and palatability of sauces. Nine (9) specific food uses such as Cochlospermum spp. root powder frying (19.3 %), yam stew (9.68%), cassava stew (3.23 %), fatty rice (3.23%), amaranth sauce (19.3 %), peanut sauce (12.9 %), eggplant sauce (12.9 %), bombax sauce (3.23 %), okra sauce (16.1%) are reported in Northern Borgou. Five (5) specific food uses, including yam stew (11.1%), amaranth sauce (44.4%), bombax sauce (5.6%), Corchorus olitorius sauce (11.1%) and okra sauce (27.8%) are reported in Atacora Chain. In Mékrou-Pendjari, eight (8) specific food uses, namely fatty rice (34.5%), amaranth sauce (3.45%), peanut sauce (10.3%), Corchorus olitorius sauce (10.3%), okra sauce (27.6%), Cochlospermum spp. root powder sauce (6.9%), tomato sauce (3.45%), and baobab leaf sauce (3.45%) are reported. Okra sauce is found to be largely used with Cochlospermum spp. root powder in the three phyto-districts especially in Atacora chain and Mékrou-Pendjari where at least 27% of respondents underlined the use of Cochlospermum spp. root powder as an important food ingredient in okra sauce. It is important to underline okra sauce referred to any sauce made from any part of okra particularly okra fruit sauce or okra leaf (dry or fresh) sauce.

Concerning medicinal uses, Cochlospermum spp. root powder is widely used. In Northern Borgou, thirteen (13) medicinal uses of Cochlospermum spp. root powder are identified. Only four (4) against five (5) medicinal uses are reported in Atacora chain and Mékrou-Pendjari respectively. In each of the three phyto-districts, yellow fever, stomachaches, jaundice, and malaria are reported. In the specific case of jaundice and malaria, 72.2 % of respondents in Atacora Chain and 51.7% of respondents in Mékrou Pendjari have mentioned these medicinal uses respectively.

Relationship between socio-demographic factors and use values of Cochlospermum spp. root powder

Table 4 shows the relationship between socio-demographic factors and the use values of Cochlospermum spp. root powder. Only phyto-district and ethnic group have significant effects ($p<0.001$) on the total use value of Cochlospermum spp. root powder. The highest total use value (8.20) is recorded in Northern Borgou and the lowest total use value in Mékrou-Pendjari (5.3) (Figure 2 a). The ethnic group Waama have the highest total use value (7.9) while Gourmantché ethnic group have the lowest total value use (2.81) (Figure 2 f). The food use of Cochlospermum spp. root powder differed significantly among phyto-districts ($p<0.001$), gender ($p=0.010$), education level ($p=0.014$), profession ($p=0.046$) and ethnic group ($p<0.001$). Accordingly, Northern Borgou phyto-district, men, key informants without any formal education, processor, Peulh and Waama have the highest food use value, 5.98, 5.66, 5.29, 5.63, 6.02 and 5.96, respectively (Figure 3 acdef). The ethnic group Gourmantché have the lowest food use value (1.01). Significant differences were only found among age category ($p<0.049$) and education level ($p<0.035$) in terms of medicinal uses of Cochlospermum spp. root powder (Table 4). The highest medicinal use value (1.64) is associated with elderly people followed by the adult (1.39) and the younger (1.22), figure 4 b. Respondents with secondary education reported the highest medicinal use value (1.85) followed by those without any formal education (1.45) and primary (1.04) level (Figure 4 d).

Storage mode and economic importance of Cochlospermum spp. root powder

Processors store Cochlospermum spp. root powder in four (4) different types of containers, namely bowl, water bottle, double bag and sachets. Processors use mainly “sachets” (44.4%) and “double bag” (35.9%) as containers for Cochlospermum spp. root powder. Water bottle and bowl were used respectively by a limited number of processors (< 15 %).

The price per Kg (in FCFA) of Cochlospermum spp. root powder ranges between 121 and 726 (Table 5). This price of Cochlospermum spp. root powder varies significantly according to phyto-

district and ethnic groups ($p<0.001$). Cochlospermum spp. root powder is significantly more expensive in Atacora Chain (449 FCFA/Kg) than Northern Borgou (330 FCFA/Kg) and Mékrou Pendjari (383 FCFA/Kg). Considering ethnic groups, Cochlospermum spp. root powder is cheaper among Boo, Peulh and Dendi (279 -337 FCFA/Kg). The highest price/Kg are 499 and 441 among Bariba and Waama respectively. The processor brut monthly income (FCFA) generated by the trade of Cochlospermum spp. root powder ranges from 2,400 to 80,000 FCFA. This brut monthly income does not vary significantly among phyto-districts ($p=0.179$) while a significant difference is observed according to ethnic groups ($p<0.001$). Bariba and Dendi have the highest brut monthly income 40,675 FCFA and 37,625 FCFA respectively while the lowest brut monthly incomes are from Boo (16,891 FCFA) and Waama (20,631 FCFA).

DISCUSSION

Diversity of food uses of Cochlospermum spp. root powder: implication for food valorization

Cochlospermum spp. root powder is widely used as food ingredients by local populations. Indeed, rootstock of Cochlospermum spp. is collected from the wild, cleaned, pounded and dried (data from processors) and local population uses this powder in substitution to tomato (DGFRN, 2014). Some respondents reported that they cannot prepare a sauce without Cochlospermum spp. root powder. Regardless the phyto-district, the most popular sauce (especially in Atacora chain and Mékrou-Pendjari) is okra sauce (fresh leaf, dry leaf, fresh fruit or dry fruit) followed by amaranth sauce (especially in Northern Borgou and Atacora Chain). Okra sauce has gained this importance because of its high availability during rainy season and the local populations have facilities (solar energy for sun-drying) to process its leaf or fruits into powder, which can be used year-round. A sauce made especially from Cochlospermum spp. root powder was also identified in Mékrou-Pendjari. This is in accordance with the findings of Affonfere (2018) who identified the sauce of Cochlospermum tinctorium root powder as a candidate food vehicle for food fortification with moringa leaf powder in Tanguiéta, a municipality of Mékrou-Pendjari phyto-district. A significant difference in the food use of Cochlospermum spp. root powder was noticed for phyto-districts and ethnic groups. According to Chadare et al. (2008), ethnic groups are located in specific localities; the combination of an ethnic group and its locality may be determinant for their food uses since food practices are usually cultural. Many studies also found the variation of indigenous knowledge on species according to socio-cultural groups (Assogba et al., 2017; Assogbadjo et al., 2011; De Caluwé et al., 2009; Ekué et al., 2010; Fandohan et al., 2017). In the present study, the highest food use values were recorded among Waama (especially encountered in Atacora Chain) and Peulh (especially in Northern Borgou) ethnic groups and the lowest among Gourmantché ethnic group. This suggests that Peulh and Waama ethnic groups are more familiar with the various uses of Cochlospermum spp. root powder as food ingredients. These food uses of Cochlospermum spp. root powder (especially in sauces) coupled with the diversity of sauces consumed in Northern Benin are useful indicators for food valorization of the species due to the cultural acceptability of the species. Additionally, as the main staple food in many parts of Sub-Saharan Africa is starch foods (Amegnaglo, 2018; Ekpa et al., 2019) accompanied with sauces (Galan et al., 1990), there is a great pathway to promote the consumption of the specie. Cochlospermum spp. root powder was previously suggested to be promoted as traditional food fortificant based on its mineral content especially iron (Affonfere, 2018). This promotion could be supported by the large food uses of the species among local population. Ndouyang et al. (2021) have recently developed a therapeutic infant gruel using Cochlospermum tinctorium root powder as food ingredient. This therapeutic infant gruel with low viscosity was believed to restore human health (stopping of diarrhea) and regulate the activity of life organs function such as liver. Based on the iron content of Cochlospermum tinctorium root powder up to 70.1 mg/100 g dw (Chadare et al., 2017) and its health benefit effect (Ahmad et al., 2021; Ahmadu et al., 2014; Ballin et al., 2002), it could be used to enrich the wide range of porridges used for complementary feeding in Benin. Nevertheless, only few data are available on the nutritional value of Cochlospermum spp. root powder. The available

nutritional data are especially on mineral and proximate composition (Affonfere et al., 2021; Amubode, 1991; Ayosso, 2016; Mhomga et al., 2019). Therefore, there is a need to fully investigate the nutritional (vitamin, anti-nutrients factors, amino-acid profile) potential of this species to proper advice local populations for food and nutritional security. Studies on functional properties (Ndouyang et al., 2018) of Cochlospermum spp. root powder such as bioaccessibility of key minerals will also be of importance to assess the effectiveness of nutritional potential of this species. Cochlospermum spp. root powder apart from being very important in the food habit of local population also presents a wide diversity of medicinal uses.

Diversity of medicinal uses of Cochlospermum spp. root powder

Cochlospermum spp. root powder is widely used for medicinal purpose throughout the three phyto-districts of sudanian zone of Benin. Many studies have also reported medicinal uses for Cochlospermum spp. root (Ahmad et al., 2021; Ahmadu et al., 2014; Ballin et al., 2002; Catarino et al., 2016; Inngjerdingen et al., 2014; Inngjerdingen et al., 2013; Johnson et al., 2018; Ndouyang et al., 2021) found in the present study. Nevertheless, few of these medicinal uses (pain and inflammation, ulcer, malaria, infectious diseases, helminthiasis and liver diseases) were pharmacologically confirmed (Ahmad et al., 2021) and then scientific investigations are necessary to authenticate the remaining medicinal uses (jaundice, diabetes, bronchial infections, fever, stomach pain). Only age category and education level significantly affect the medicinal uses of Cochlospermum spp. root powder. The older have the highest medicinal use value and the young the lowest meaning the elders have accumulated the knowledge on the species over the years. The same trend was observed by Akpovo and Fandohan (2021) who found that the elder have the highest traditional knowledge on Ricinodendron heudelotii in Benin. According to Azis et al., (2020), the difference in the local knowledge of medicinal plants between the older and younger community members shows the erosion of knowledge because modernity has lowered young people’s appreciation of local knowledge of traditional medicinal plants. Additionally, medicinal uses are often specific, rare and mostly devoted to adults and old people and may explain why old people are more knowledgeable than young people (Goudégnon et al., 2017). In that framework, it could be expected that respondents without any formal education (especially older) had the highest medicinal use value. However, in this study, respondents with the high education (secondary school level) had the highest medicinal use value on Cochlospermum spp. root powder. Indeed, in the specific case of Cochlospermum spp. root powder many formal educated people through the counseling of health agents and some nutrition center (i.e. nutritional rehabilitation center of Tanguiéta in Mékrou Pendjari phyto-district) have gained important knowledge on this species. The species is also promoted for its health benefits through the drug shops known to be poorly visited by people without any formal education. Cochlospermum spp. root powder was also reported by respondents to be used to treat anaemia. Ahmadu et al. (2014) have confirmed this medicinal use when they observed that Cochlospermum tinctorium root bark extract possess anaemia ameliorating properties. This could be possibly due to its iron content. Cochlospermum tinctorium root powder was found to contain 26.8 to 70.1 mg/100 g dw of iron (Affonfere et al., 2021; Chadare et al., 2017). Furthermore, the use of Cochlospermum spp. root for gastro-intestinal disease and anti-malaria issue (Ahmad et al., 2021) could also confer the anti-anaemia property to this species, as anemia is known to also be the consequences of infectious diseases, including diarrhea diseases, malaria and gastrointestinal illnesses (Cameron et al., 2017). The diversified medicinal uses of Cochlospermum spp. root powder suggests that it will be interesting for further studies to focus on the drug potentials of the species.

Processing of Cochlospermum spp. root as an income-generating activity

The processing of Cochlospermum spp. root involve especially its sun drying, milling and sieving and the powder obtained is commercialized in the local markets. Achigan-Dako et al. (2009) have also mentioned that local population in Northern Benin sold Cochlospermum spp. root powder in local markets. Cochlospermum spp. root powder is more expensive in Atacora Chain phyto-district (449 FCFA/Kg) and among Waama ethnic group (441.10 FCFA/Kg). Indeed, in this phyto-district,

which involved especially Waama ethnic group, the supply of Cochlospermum spp. root powder is low (due to the scarcity of the species). Additionally, most of the traders encountered in this phyto-district buy Cochlospermum spp. root powder from Malanville (Mékrou-pendjari phyto-district) and will then pay the additional cost due to the transport cost. The production and marketing of the Cochlospermum spp. root powder generate income for local populations. According to Favi et al. (2021), Cochlospermum tinctorium and Cochlospermum planchonii highly contribute to monetary income and livelihood security across rural communities of West African countries as Benin. The highest brut monthly income is obtained among Bariba (40,675 FCFA) and Dendi (37,625 FCFA) in Mékrou-Pendjari phyto-district. Dendi ethnic group are found especially in Malanville where the production of Cochlospermum spp. root powder is a common activity of women. Particularly, in the village of Banité 2 (locality of Géné), a processing unit is installed for dried Cochlospermum spp. root milling. This is to satisfy the demand of local market and those of buyers coming from Tchad, Burkina-Faso and Nigeria sometimes. This brut monthly income from the processing activities of Cochlospermum spp. root could support the food security of households by providing them money to afford nutritious foods. Nevertheless, most of processors are facing a challenge because the species become scarce. This scarcity of the species is due to its overuse combine with the wide range of food and medicinal uses as mentioned previously. Indeed, harvest the rootstocks by processors implies the digging out of the species, which lead to the decline of the species population. In West African countries such as Benin, Mali and Ghana due to anthropic pressure, the decline of the species was underlined (Asase et al., 2005; Inngjerdingen et al., 2013; Sinsin and Oumorou, 2000). Therefore, there is a need for conservation and domestication actions. However, domestication is a long process and required scientific evidences. Favi et al. (2021) have identified the main protected areas that have highly suitable for conservation of Cochlospermum tinctorium and Cochlospermum planchonii in Benin. Domestication of such species will play a crucial role in food and nutritional security and will increase the income of processors, and even provides business opportunities. It is then important to carry out study on conservation and propagation methods of this species.

CONCLUSION

Cochlospermum spp. root powder is a well-known resource and used in different ways by local populations in Sudanian zone of Benin. Medicinal use value of the species does not vary significantly according to ethnic group whereas ethnic differences in food use value were observed in this study. Among all study ethnic groups, Waama and Peulh have the highest food use value. Processors of Cochlospermum spp. root from Bariba and Dendi ethnic groups had the highest brut monthly income from the sale of Cochlospermum spp. root powder. Based on the food and medicinal uses of Cochlospermum spp. root powder, it could be promoted for health and food security among population.

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