Research Application Summary

# Native edible tree/shrub species available in Benin for enhancing food security of local populations

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## Abstract

Native edible tree/shrub species (NETS) are very important resources for local people in Sub-Saharan Africa. This study aimed at documenting these resources in Benin and evaluating the traditional knowledge of local populations on NETS. A literature review was conducted through consultation of available documents in libraries, research centers and institutes, ministries and other services dealing with wild food crops in general and NETS in particular. Then, ethnobotanical surveys using a semi-structured questionnaire were conducted in two districts in the Sudanian zone and two districts in the Guineo-Congolese zone. A sample of 160 informants (men and women) from the two major ethnic groups of each zone was considered. Descriptive statistics were used to present the values of different parameters measured and/or collected. Spearman's correlation coefficient was used to compare the similarity of knowledge of diversity across environments; then the priority species were presented. In Benin, there are 121 NETS belonging to 90 genera and 38 families. From a nutrient composition point of view, most NETS have considerable amount of lipids (*Blighia sapida*, 20.1 g/100 g of DM), fiber (*Borassus aethiopum*, 18.6 g/100 g of DM) and  carbohydrates (*Dialium guineense*, 79 g/100 g de DM). Similarities were observed between socio-cultural groups living in the same region. Fruits, leaves, bark and roots were the most exploited organs in both zones. *Adansonia digitata* and *Irvingia gabonensis* were the priority species for use  in the Sudanian and Guineo-Congolese zones, respectively. These species were widely used for food but also medicinal and socio-cultural purposes. Extensive agriculture and the collection of species organs were the major threats to NETS. There is also little interest in growing these species among respondents. An awareness of the NETS' threats is essential for sustainable management and their long-term availability to ensure the food and nutritional functions that they provide.

**Key words:** *Adansonia digitata*, Benin, Ethnobotanical surveys, *Irvingia gabonensis*

## Résumé

Les espèces d'arbres/arbustes comestibles indigènes (EACI) sont des ressources très importantes pour les populations locales en Afrique subsaharienne. Cette étude visait à documenter ces ressources au Bénin et évaluer les connaissances traditionnelles des populations locales sur les EACI. Une revue de la littérature a été menée sur des documents

disponibles dans les bibliothèques, centres et instituts de recherche, ministères et autres services traitant des cultures vivrières sauvages en général et des EACI en particulier. Ensuite, des enquêtes ethnobotaniques à l'aide d'un questionnaire semi-structuré ont été menées dans deux districts de la zone soudanienne et deux districts de la zone guinéo-congolaise. Un échantillon de 160 informateurs (hommes et femmes) des deux principaux groupes ethniques de chaque zone a été considéré. Des statistiques descriptives ont été utilisées pour présenter les valeurs des différents paramètres mesurés. Le coefficient de corrélation de Spearman a été utilisé pour comparer la similitude des connaissances sur la diversité; puis les espèces prioritaires ont été présentées. Au Bénin, il existe 121 EACI appartenant à 90 genres et 38 familles. Du point de vue composition des nutriments, la plupart des EACI contiennent une quantité considérable de lipides (*Blighia sapida*, 20,1 g / 100 g de MS), de fibres (*Borassus aethiopum*, 18,6 g / 100 g de MS) et de glucides (*Dialium guineense*, 79 g / 100 g de MS). Des similitudes ont été observées entre les groupes socioculturels vivant dans la même région. Les fruits, les feuilles, l'écorce et les racines étaient les organes les plus exploités dans les deux zones. *Adansonia digitata* et *Irvingia gabonensis* étaient les espèces prioritaires d'usage, respectivement dans les zones soudanienne et guinéo-congolaise. Ces espèces étaient largement utilisées à des fins alimentaires mais aussi médicinales et socioculturelles. L'agriculture extensive et la collecte d'organes d'espèces étaient les principales menaces pour les EACI. Une prise de conscience des menaces des EACI est essentielle pour une gestion durable et leur disponibilité à long terme pour assurer les fonctions alimentaires et nutritionnelles qu'elles fournissent.

**Mots clés:** *Adansonia digitata*, Bénin, enquêtes ethnobotaniques, *Irvingia gabonensis*

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## Introduction

Native edible tree/shrub species (NETS) are an integral part of wild food plants and play an important role in the livelihoods and culture of populations in Sub-Saharan Africa (Assogbadjo *et al.,* 2017; Madamo *et al.,* 2017). Several organs or parts of these plants such as leaves, flowers, fruits, bark, roots, stems, sap, gum and resins are locally valued. The socio-economic importance of these resources is currently unanimously recognized (Codjia *et al.,* 2003; Avocèvou-Ayisso *et al.,* 2009; Moupela *et al.,* 2011; Mala, 2017). According to the World Health Organization (WHO), "wild" plants help meet the health and nutrition needs of 80% of people living in developing countries (van Andel, 2006). These species are important food and nutrition supplements in the tropics where people's livelihoods are often rudimentary or very limited. FAO (2004) has revealed that 1.6 billion people depend on forest resources including wild fruits for their survival, and that 75% of these people live in developing countries in the tropics.

Considering the 2807 plant species inventoried in the forest ecosystems of Benin (Akoègninou *et al.,* 2006), 172 are consumed by local populations as food plants (Codjia *et al.,* 2003). Because of their socio-economic, food and commercial importance, Benin's NETS have been the subject of several ethnobotanical research studies (Fandohan 2011, Gouwakinnou, 2011, Houéhanou, 2012), socio-economic (Vodouhê, 2011), genetic (Assogbadjo, 2006; Ekué, 2009), physicochemical and microbiological (Azokpota, 2005; Chadare, 2010). The interest of these studies was to collect as much information as possible

in order to take these products out of the shadows and show how their development can contribute to income improvement, poverty reduction and sustainable management of natural resources. Despite all this proven importance of wild food trees and shrubs and the efforts made by scientific research in Benin, knowledge about species remains scattered and uncoordinated.

Even though there is evidence that the dependence of rural communities that are neither farmers nor herders on wild-growing plants is obvious, the amount of income derived from non-timber forest products is not well documented (FAO, 2015). In general, only the resources traded in the markets are accounted for, and not all, in the absence of a systematic and rigorous system of data collection at the country level. Most NETS used in household consumption and illicit trade are often overlooked by policymakers, especially for products that are more important to the poor or marginalized groups (FAO, 2015). As a result, these resources can be ignored in the formal planning of land use and as part of the investment in large-scale projects. Moreover, several threat factors weigh on these species and hinder their sustainable management (Houéhanou, 2012). However, knowledge of these threat factors is important in order to reverse the rapidly declining population trends of these species and to increase the size of the populations and to see the possibilities of their integration into programs to combat food and nutritional insecurity in Benin and other Sub-Saharan countries.

The objective of this study was to take stock of work already done on NETS at the level of village lands in Benin and to highlight the perceptions of the local populations on biodiversity, uses especially food, species with high food and nutritional potential, threats and opportunities for sustainable management of these species.

**Methodology**

The study was carried out using two approaches. The first was review of literature on NETS. Literature held in libraries, research centers and institutes, ministries and other services dealing with wild food crops in general and NETS in particular was reviewed. Secondly, semi-structured individual interviews were conducted to assess traditional knowledge of local populations on NETS. Sampling of study areas was purposive. Two sites were selected based on their recognized level of food and nutrition insecurity at the country level. They are: Matéri (in Sudanian zone) and Comé (in Guinéo-Congolese zone). At the time of the study, these two districts were classified as zones of food insecurity in Benin (AGVSA, 2014). In Matéri, 35% of the households were affected while in Comé 19% of the households were affected with food insecurity (AGVSA, 2014). From each of these districts, two villages were selected: Pingou and Dasssari (Matéri) and Gadomé and Houngodoé (Comé). In each village, interviews were conducted with the actors considering both sexes and the two major ethnic groups. For this purpose, 10 women and 10 men were selected by ethnic group. A total of 160 people of both sexes were interviewed. Biodata were gathered from the respondents and included names, age, sex, ethnicity, religion, work, level of education, residence status and marital status. Data were also obtained on the main uses made of each of the species, species availability and sustainable management strategies. Descriptive statistics were used to present the values of different parameters. Spearman's correlation coefficient was used to compare the similarity of knowledge of diversity across environments; then the priority species were presented.

## Results and Discussion

In Benin, 121 NETS were identified and belonged to 90 genera and 38 families. This diversity is about three times higher than the number (43) of species recorded in agroforestry systems by Assogbadjo *et al.* (2012). This difference could be explained by the fact that a small part of forest biodiversity is found in agroforestry systems. As a result, there is a huge potential for NETS that can be used to ensure household food and nutrition security.

From a nutrient composition point of view, most NETS have considerable amount of lipids (*Blighia sapida*, 20.1 g/100 g of DM), fiber (*Borassus aethiopum*, 18.6 g/100 g of DM) and carbohydrates (*Dialium guineense*, 79 g/100 g de DM). As a result, utilization of several species at the same time would make it possible to compensate for the low levels of certain nutrients in certain species.

Similarities were observed between socio-cultural groups living in the same region. Fruits, leaves, bark and roots were the most exploited organs in both zones (Figure 1). *Adansonia digitata* and *Irvingia gabonensis* were the priority species for use in Sudanian and Guineo-Congolese zones, respectively (Table 1). These species were widely used for food but also medicinal and socio-cultural purposes. Extensive agriculture and the collection of species organs were the major threats to NETS.

The urgency of organizing more NETS in the sector is undeniable, all the more so as this would strengthen their contribution to the fight against poverty (Avocêvou-ayisso, 2011, Vodouhê 2011). Lack of ignorance of the potential of some NETS due to a lack of inventory; a lack of adequate knowledge of the role that these products play in the household economy and food security in the country; and limited capacity of main actors to access relevant information on NETS markets at the local and regional level are obstacles to the development of this sub-sector.

## Conclusion

Clearly NETS have enormous biological, socio-economic and cultural potential that deserve to be valued in order to achieve food and nutrition security in Benin's current major food insecurity zones and also to produce goods and services useful to local populations. Many NETS are known and used by local people. Even though several parts of most of these plant species (flowers, fruits, leaves, roots, barks, sap) are used for food and for medicinal purposes, several species still remain under-valued or neglected. As a result, there are currently very few initiatives to ensure the availability of these resources, which are mainly threatened by agriculture.

## Acknowledgment

**Table 1. List of priority NETS for utilization in Guineo-Congolese and Sudanian regions of Benin**

| Sudanian Zone | Rank | Guineo-Congolese Zone | Rank |
|---|---|---|---|
| *Adansonia digitata* | 1 | *Irvingia gabonensis* | 1 |
| *Tamarindus indica* | 2 | *Chrysophylum albidum* | 2 |
| *Parkia biglobosa* | 3 | D*ialium guineense* | 3 |
| *Vitellaria paradox*a | 4 | Vitex doniana | 4 |
| *Blighia sapid*a | 5 | *Garcinia kola* | 5 |
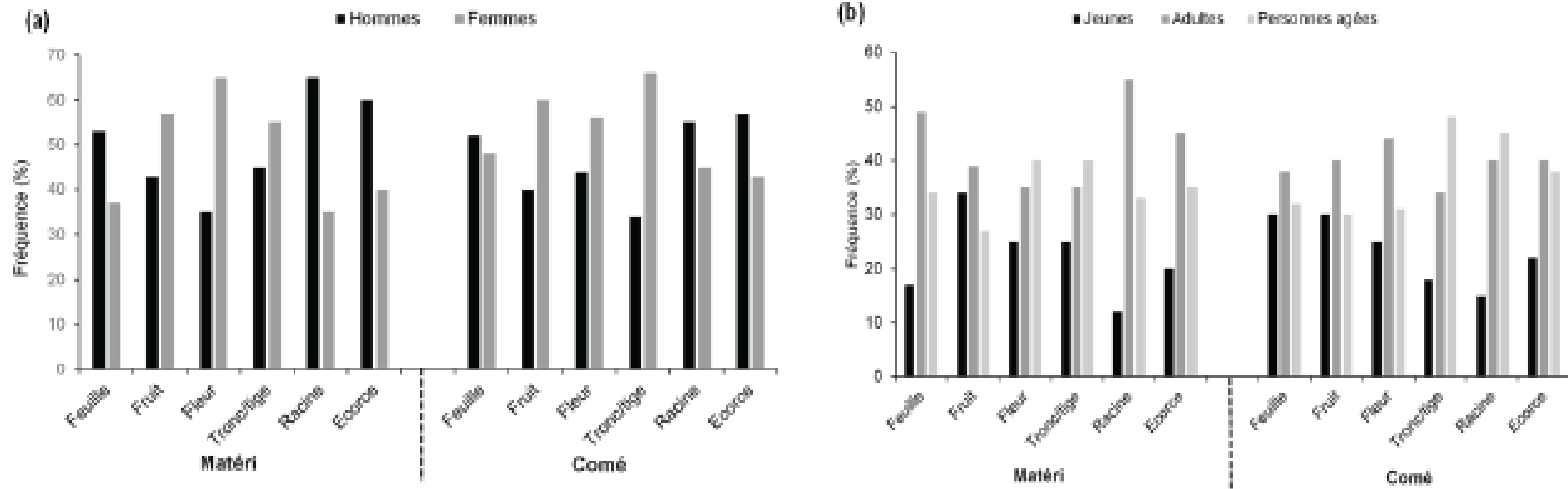


Figure 1.  Uses of NETS' parts by (a) gender (men and women) and (b) age categories

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