Local knowledge of agricultural biodiversity and food uses of edible plant species in two agroecological zones of southern Benin

Elie Koukou, Waliou Amoussa Hounkpatin, Sognigbé N'Danikou, Comlan Vincent De Paul Sounouke, Gervais Ntandou-Bouzitou and Céline Termote

Correspondence

Elie Koukou[1*], Waliou Amoussa Hounkpatin[1], Sognigbé N'Danikou[2,3,4,] Comlan Vincent De Paul Sounouke[1], Gervais Ntandou-Bouzitou[5] and Céline Termote[6]

[1]Ecole de Nutrition et des Sciences & Technologies Alimentaires, Faculté des Sciences Agronomiques, Université d'Abomey-Calavi, Bénin
[2]World Vegetable Center, Benin
[3]Laboratory of Genetics, Biotechnology and Seed Science (GBioS), School of Plant Sciences, University of Abomey-Calavi, 01 BP 526, Abomey-Calavi, Republic of Benin
[4]Ecole d'Horticulture et d'Aménagement des Espaces Verts, Université Nationale d'Agriculture, BP 43 Kétou, République du Bénin
[5]Food and Agricultural Organization of the United Nations, Niger
[6]Alliance Bioversity International-CIAT Regional Centre of Africa

[*]Corresponding Author: eliekoukou@gmail.com

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Research

Abstract

Background: Locally available food plants are not only a good source of essential micronutrients but also provided culturally acceptable foods. Their evaluation could be a sustainable strategy that can effectively meet the nutrient requirements for vulnerable groups in rural areas. They are therefore of great importance in ensuring food security in low- and middle-income countries. Several communities in Benin depend mainly on indigenous food sources especially plant species.

Method: An ethnobotanical survey was conducted in southern Benin to document the edible plant species (EPS) used by people living in two agroecological zones (AEZ 6 and AEZ 8). Field investigations were carried out in eight villages of the two agroecological zones, with four villages per agroecological zone. Data were collected through focus group discussions (FGDs) and analyzed using descriptive statistics.

Results: A total of 146 edible plant species belonging to 46 families were recorded and herbarium specimens were collected and deposited at the national herbarium of Benin. Species diversity was lower in AEZ 6 compared with AEZ 8. Herbs and shrubs were the dominant plant habits, with leaves and fruits (arils, flesh, pulp) as the most reported plant parts that were consumed mainly as leafy vegetables or fruits.

Conclusion: The study area harbors an important plant diversity with high nutritional potential. Nutrient-dense leafy vegetables and fruit species were dominant. This represents an opportunity that could be used to improve

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diet quality and food security in the study area. However, the locally available food plant species remain undervalued.

Keywords: agrobiodiversity, neglected and underutilized species, local foods, Ethnobotany.

Background

According to FAO /PAR (2011), agricultural biodiversity (Agrobiodiversity) includes all the components of biological diversity of relevance to food and agriculture, and those that constitute the agroecosystem: the variety and variability of animals, plants and microorganisms at the genetic, species and ecosystem levels, which sustain the functions, structure and processes of the agroecosystem. It also plays a critical role in global food production and the livelihoods and well-being of all, regardless of resource endowment or geographical location. As such, it is an essential component of any food system. Agrobiodiversity is recognized as a culturally acceptable, low-input source of nutritious food that is often adapted to local farming systems (Bioversity International 2016).

In most low- and middle-income African countries (LMICs) like Benin, most people depend on indigenous plant food resources for food security. These resources vary according to agroecological zones (Achigan-Dako *et al.* 2010, Chadare *et al.* 2018, Codjia *et al.* 2003) leading to diversity in diets. Several studies have documented how agrobiodiversity is used by local people in Africa. Nemoga (2019) and Whyte (2017) estimated that local and regional agrobiodiversity is well recognized as indispensable to the nutritional security and food sovereignty of many indigenous smallholder communities. However, there is limited use of plant species diversity worldwide, even though it constitutes a source of micronutrients for humanity (Cantwell-Jones *et al.* 2022). Indeed, only 7039 of the 40292 species of edible plants identified are used as human food globally (Diazgranados *et al.* 2020), indicating their neglect or the lack of knowledge on the food and nutritional value of agricultural biodiversity. Benin is among the sub-Saharan African countries with a high diversity richness of edible plant species, between 501 and 900 edible plant species (Ulian *et al.* 2020). Therefore, it is necessary to realize the value of agrobiodiversity through its increased use. This requires an understanding of the state of the food knowledge of the local populations. Studies have reported on ethnobotanical knowledge. Among others, Pandey *et al.* (2021) reported 39 crops and 04 indigenous breeds of livestock in the jhum (North-eastern India) farming system. These species were categorized into five core food groups that sustain nutritional security and the food culture of indigenous people. In Ethiopia, an ethnobotanical study on wild edible plants documented a total of 33 wild edible species. Of these, the families Moraceae, Fabaceae and Solanaceae were the most dominant, with fruits being the most edible parts (Abera 2022). León-Lobos *et al.* (2022) found that 330 native species were documented as food plants, representing 7.8% of the total flora of Chile. These species belong to 196 genera and 84 families, with Asteraceae, Cactaceae, Fabaceae, Solanaceae and Apiaceae as the most diverse families. An ethnobotanical survey of wild food plants used by the local communities of Kumrat Valley in District Upper Dir, Pakistan counted 50 species of wild food plants and two fungal species comprising 30 taxonomic families and 40 genera. The Rosaceae family dominated with the highest species number (6 species), followed by Moraceae and Leguminosae. It is apparent, therefore, that some plant families provide more food species than others. With respect to plant habits, herbs, trees and shrubs are the most dominant (Ahmad *et al.* 2021). In Kashmir, a western region of Himalaya, a study related to food and culture recorded 75 edible species used in cultural foods in the Kashmir valley. Generally, vegetables, fruits and spices are dominant in the edible species in ethnobotanical surveys (Hassan *et al.* 2021a, Pieroni *et al.* 2017, Aboukhalaf *et al.* 2022). Traditional knowledge and use of wild edible plants in Sidi Bennour region (Central Morocco) indicated that a total of 56 plant species representing 56 genera and 27 families were used to make different food dishes and others. The most cited wild edible plants (WEPs) family was Asteraceae (Aboukhalaf *et al.* 2022).

In Benin, several studies have shown a diversity of locally available plant and animal species that could be used as sources of foods with good nutritional value. Codjia *et al.* (2003), Dansi *et al.* (2009) and Achigan-Dako *et al.* (2010) inventoried respectively 162 edible plant species, 187 leafy vegetables in three agroecological zones and covered 73 villages, and 245 plant species belonging to 62 families that were used by communities. Indeed, species such as *Annona senegalensis* (Codjia *et al.* 2003), *Borassus aethiopum* (Codjia *et al.* 2003, Djagoun *et al.* 2010) as well as *Elaeis guineensis* (Akoègninou *et al.* 2006); *Adansonia digitata* (Chadare 2010); *Moringa oleifera* (Ashok & Preeti 2012); *Amaranthus cruentus, Solanum nigrum, Cleome gynandra* (Stoilova *et al.* 2014) contain not only high but also variable levels of essential nutrients. In southern Benin, ethnobotanical survey of 231 adults (138 men and 93 women) who recognized the species, revealed that 100% of them recognize the use of ripe fruits of *Annona muricata* as food (Gbonsou *et al.* 2020). Another study conducted on the knowledge and use of *Cola millenii* showed that the food use of the fruit pulp is a common practice in the Guinean and Sudano-Guinean zones of Benin (Lawin *et al.* 2019).

The use of local food resources in infant and young children's food formulations is strongly encouraged to meet their nutritional requirements (Kageliza *et al.* 2014, Mitchikpe *et al.* 2010). The first step for achieving such a goal starts with the inventory and screening of available edible food resources in local communities to enable the selection of the most suitable products for designing appropriate nutritional food formulae. Ethnobotanical studies conducted in Benin have so far been limited to the inventory and description of the plant habits of the species (Achigan-Dako *et al.* 2010, Chadare *et al.* 2018, Dansi *et al.* 2008). There is a lack of knowledge on the specific food uses of these species by local populations, as well as their culinary knowledge to better characterize these species. This study, therefore, aimed to fill part of this gap by addressing, beyond the inventory, the different food uses in two agroecological zones (AEZs) of southern Benin. The study, therefore, documented local edible plants across the two AEZs, with a focus on their richness and how they are used by the indigenous populations in rural Benin.

Material and Methods

Study site

Mono Department in Southern Benin was selected as a research site because of its potential richness in agricultural biodiversity. The Department also faces a high prevalence of chronic malnutrition (29%) (INSAE & ICF 2019). Mono Department is located in southwestern Benin and occupies 1605 Km^2. It comprises six communes (Athiémé, Bopa, Comè, Grand-Popo, Houéyogbé and Lokossa) and 276 villages. The total population in 2013 was 497,0243 inhabitants (INSAE 2016). The study area is characterized by a subequatorial climate of Sudano-Guinean type with four seasons (a long dry season from November to March, a long rainy season from April to July, a short dry season from July to August, and a short rainy season from August till November). Annual precipitation varies from 850 to 1160 mm and average annual temperatures are around 28 °C. A purposive sampling allowed the selection of two communes, Houéyogbé and Bopa belonging to respectively agroecological zone 6 (AEZ 6) and agroecological zone 8 (AEZ 8) (Fig. 1).

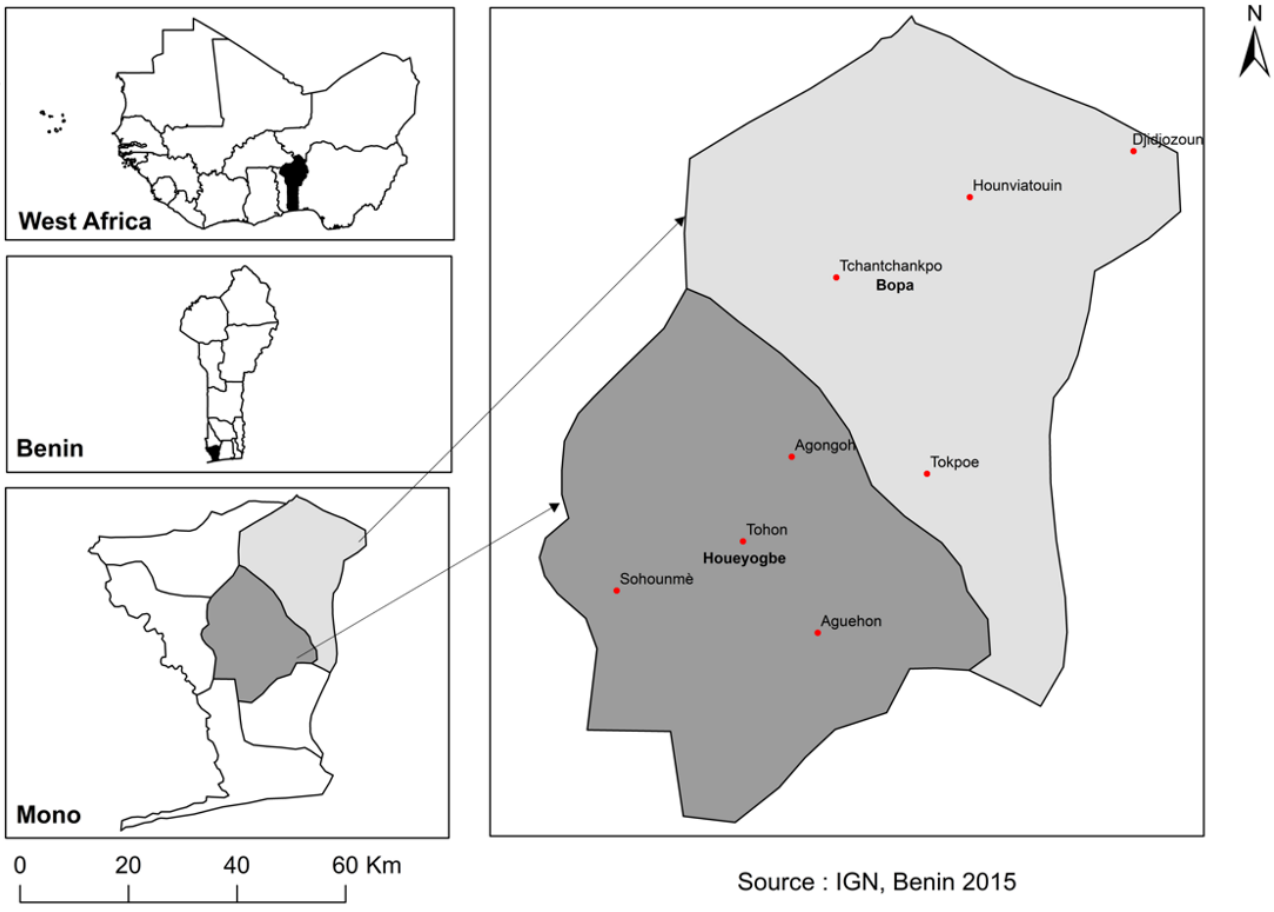

Figure 1. Survey area

The communes comprise several villages including Hounviatouin, Djidjozoun, Tokpoe, Tchantchankpo, Sohoumè, Aguehon, Agongoh and Tohon which were considered in this study (Table 1). AEZ 6 is one of the most complexes and is dominated by the ferralitic soils. The main crops are maize, cassava, cowpea and groundnut. In this zone, the vegetation is essentially impacted by anthropogenic activities, characterized by a dense shrub thicket dominated by *Elaeis guineensis* and grasses. There are still some forest relics in a few places. AEZ 8 is mainly characterized by the development of inland and maritime fishing as a complement to agriculture, including maize, cassava, cowpeas and market gardening. Characteristic species of the natural vegetation include *Adansonia digitata*, *Ceiba pentandra*, *Antiaris toxicaria*, *Azadirachta indica* and other reforested areas consisting mainly of *Tectona grandis*, *Acacia sp.*, *Terminalia sp.*, *Kaya senegalensis*, *Chlorophora excelsa*, *Triplochiton scleroxylon, Elaesis sp*. and fruit trees. The lower vegetation is made up of grasses, marshy meadows and mangroves along the Ahémé lake. In both agroecological zones, *Sahouè* and *Kotafon* were the main spoken languages.

Ethnobotanical survey

Sampling

An ethnobotanical survey was carried out in eight villages, from the two agroecological zones through focus group discussions (FGDs). A purposive sample of four villages in Bopa and four villages in Houéyogbé was drawn, considering the diversity of soils and livelihood options available for the population living in the area. The criteria for inclusion were rural/low level of urbanization, diversity of soils, and diversity in agricultural activities (cropping, breeding, fisheries) as well as the willingness of the communities to participate in the study. Each focus group was composed of key informants knowledgeable in plant uses, that were selected in collaboration with the village headman (Cotton 1996).

Focus group discussions **(FGDs)**

An exploratory qualitative approach, via focus group discussions, was used to document all edible plant species (EPS) known at the village level and to gain insights into their uses. The decision to opt for participatory focus group discussions stems from the fact that we were interested in an inventory of all EPS known and used per village/ethnic group, rather than a more in-depth individual informants' knowledge. Mixed focus group discussions (men and women) were organized over one (1) week in each village to document all locally available food plants. The FGDs involved a total of 80 participants, with an average of 10 participants per village (Table 1).

Study objectives and activities were explained before seeking the participant's written prior informed consent. During the first session in each village, we asked participants to enumerate all local plants they know and use as foods ("free listing" exercises) as suggested by Cotton (1996). These included all food plant species/varieties produced and consumed locally (wild as well as cultivated) and the foods derived from them as well as a list of additional foods that are consumed but not produced locally (exclusively bought from the market). To structure the discussion, participants were asked to name the plants (and foods derived) per commodity (fruits, leafy vegetables, other vegetables, roots, tubers, cereals, legumes, and nuts (domesticated as well as wild). Plant names were recorded in their native languages (*Sahouè/Kotafon*), and per village, and a list of all EPS was compiled.

During subsequent focus group sessions, participants discussed the characteristics of the species, as well as their habits, edible parts and specific food uses for each listed species. At the end of this exercise, a book with pictures of documented food plants was presented to the participants, to probe for any missing species from their list. They were given some time to examine the different pictures and complete their list with any species that are grown and/or consumed in their village but were omitted during the free listing exercise.

Species collection and identification

The list of food plant species developed by FGD participants were used to collect herbarium specimens of the different species from cultivated and uncultivated lands. Two participants were selected to guide the researchers in the field to collect the specimens. For each specimen collected, village name, date of collection, collectors' name and reference number, species local name, plant habit, geographical coordinates, and reference numbers of photographs were recorded. The photos and collected samples helped later on, after the fieldwork, in the identification of the scientific names of the plant species, based on the Flora of Benin Republic (Akoègninou *et al.* 2006), and by a botanist at the National Herbarium of the University of Abomey-Calavi. The online Plant List (www.theplantlist.org), the World Flora (www.worldfloraonline.org) and the Kew plant database (https://powo.science.kew.org) were used to crosscheck and update the scientific names of plant species.

Data analysis

All the plant species from the FGDs were tabulated and analyzed using descriptive statistics (frequencies) to generate summaries and tables per village and AEZ. The dried and processed plant specimens were allotted voucher numbers and were then submitted to the National Herbarium, for future reference. Voucher numbers of the submitted plant specimens are given after their botanical name. The categories of specific food uses were based on the level 3 descriptors for food types (Cook 1996). Other categories such as beverage (soft and alcoholic beverage), which fall under the 'other food type' category in Cook (1996) were added to the food descriptors list to better comply with field realities.

Results

Characteristics of the villages and participants in the focus groups discussions (FGDs)

The sampling approach resulted in the selection of eighty participants, all adults, including 39 men and 41 women in 8 villages (Table 1). All of the villages are characterized by soils that are suitable for agriculture. In addition to agriculture, fishing is also practiced in Djidjozoun (Bopa) and Sohoumè (Houéyogbé). Generally, In AEZ 8, agriculture, fishing, livestock and trade are the main activities, while in AEZ 6, agriculture is the main activity.

Table 1. Geographic and socio-demographic characteristics of the participants in the focus group discussion (FGDs)

Communes	Villages	Characteristics	Number of participants		Total
			Male	Female	
Bopa (AEZ 8)	Hounviatouin	Rural, vertisols, agriculture, no fishing	6	5	**11**
	Djidjozoun	Rural, hydromorphic soils, agriculture, and fishing	6	6	**12**
	Tokpoè	Rural, agriculture, no fishing	5	5	**10**
	Tchantchankpo	Rural, quite isolated, agriculture, vertisols	3	7	**10**
Houéyogbé (AEZ 6)	Sohounmè	Rural, clay-sand soils, agriculture and fishing	5	5	**10**
	Aguèhon	Rural, agriculture	4	3	**7**
	Agongoh	More or less rural, agriculture	5	5	**10**
	Tohon	Rural, hydromorphic soils, agriculture	5	5	**10**
TOTAL			**39**	**41**	**80**

Diversity of edible plant species in the study area

Results indicated that people managed high diversity of plant species in the surveyed areas (Table 2). Up to 146 edible plant species including 80 cultivated (55%), 8 semi-cultivated (5%), and 58 wilds (40%) were recorded in total. There is a slight difference between agroecological zones with 118 species in AEZ 6 and 124 in AEZ 8. Among the 46 plant families recorded, nine have at least five species. Families with more than five species included Malvaceae (19 species), Fabaceae/ Papilionaceae (11 species), Asteraceae (8 species), Amaranthaceae (8 species), and Solanaceae (7 species) (Fig. 2). All 46 botanical families recorded were known by AEZ 8 communities, while 40 were known in AEZ 6. There was a very high species diversity of food resources in the study area, although AEZ 8 presented a relatively high species richness compared to AEZ 6 (Fig. 3).

Plant habits

The habits of plant species included trees, shrubs, herbs, palms, and vines. In AEZ 6, 51.7% of species were herbs (e.g., *Pergularia daemia, Gongronema latifolium, Xanthosoma sagittifolium, Crassocephalum rubens, Launaea taraxacifolia*), 23% were shrubs (e.g., *Mussaenda elegans*, *Carpolobia lutea, Rytigynia umbellulata*), 15% were trees (e.g., *Vitex doniana, Adansonia digitata, Blighia sapida*), 7% are vines (e.g., *Telfairia occidentalis, Dioscorea bulbifera, Cucurbita pepo*), 3% were palms (e.g. *Phoenix reclinata, Elaeis guineensis, Cocos nucifera*). In AEZ 8, herbs were the most dominant species with 49%, followed by shrubs (22%), trees (19%), vines (7%), and palm (3%) which were less common (Table 2 and Fig. 3).

Table 2. Inventory of the edible plant species known by local communities of AEZs 6 and 8

Botanical Family	Scientific name	Voucher number	Local name (*Sahouè/Kotafon*)	Management	Plant habits	Edible part	Food use
Acanthaceae	*Anisostachya tenella* (Nees) Lindau	VP 282	tôlikpékpé/ dogbo-ountakoui	Semi-cultivated	Herb	Young leaves	Leafy vegetables
Amaranthaceae	*Alternanthera brasiliana* (L.) Kuntze	VP 303	fleuman / tômandohoungbé	Cultivated	Herb	Young leaves	Leafy vegetables
	Alternanthera sessilis (L.) R.Br. ex DC.	VP 035	agôman	Cultivated	Herb	Young leaves	Leafy vegetables
	Amaranthus cruentus L.	VP 246	sôman wé/fôtètè	Cultivated	Herb	Leaves	Leafy vegetables
	Amaranthus dubius Mart. ex Thell.	VP 252	tètè vè	Cultivated	Herb	Leaves	Leafy vegetables
	Amaranthus spinosus L.	VP 014	djakli / tètè èwounon	Wild	Herb	Leaves	Leafy vegetables
	Amaranthus viridis L.	VP 405	tètè wamonnonfitin/ fôtètè	Cultivated	Herb	Young leaves	Leafy vegetables
	Celosia argentea L.	VP 371	sôman / avounvô ovè	Cultivated	Herb	Leaves	Leafy vegetables
	Celosia trigyna L.	VP 05	sukloué man	Wild	Herb	Young leaves	Leafy vegetables
Amaryllidaceae	*Allium cepa* L.	NC	saboula	Cultivated	Herb	Bulb	Vegetables
Anacardiaceae	*Anacardium occidentale* L.	VP 393	cadjou	Cultivated	Shrub	Seeds/ Fruit pulp	Nuts and seeds/Fruit
	Mangifera indica L.	VP 249	manga / amanga	Cultivated	Tree	Fruit pulp	Fruit
	Spondias mombin L.	VP 189	aklikon / klikon	Cultivated	Tree	Fruit pulp	Fruit
Annonaceae	*Annona muricata* L.	VP 235	ehounon winglo / agnangloué	Cultivated	Shrub	Fruit pulp	Fruit
	Annona senegalensis Pers.	VP 191	gbédji wouinglo	Wild	Shrub	Fruit pulp	Fruit
	Annona squamosa L.	VP 410	yangloé yovoton	Cultivated	Shrub	Fruit pulp	Fruit
	Monodora tenuifolia Benth.	VP 566	séhounkôkouè	Wild	Tree	Fruit pulp	Fruit
	Uvaria chamae P. Beauv.	VP 187	gbada/gbannan	Wild	Shrub	Fruit pulp	Fruit
Apocynaceae	*Carissa spinarum* L.	VP 55	vlèhoui	Wild	Shrub	Fruit pulp	Fruit
	Gongronema latifolium Benth.	NC	kanhoui	Wild	Herb	Leaves	Leafy vegetables

	Marsdenia latifolia (Benth.) K. Schum.	VP 083	kanman	Wild	Herb	Young leaves	Leafy vegetables
	Pergularia daemia (Forssk.) Chiov.	VP 028	kpatakè / kpagnanwé	Wild	Herb	Young leaves	Leafy vegetables
Araceae	*Xanthosoma sagittifolium* (L.) Schott	VP 040	gbangali / mankanli	Cultivated	Herb	Young leaves/ Tubers	Leafy vegetables/ Staple (roots and tubers)
Arecaceae	*Borassus aethiopum* Mart.	NC	agonté / djigon	Wild	Palm	Roots/ Fruit pulp	Staple (roots and tubers)/ Fruit
	Cocos nucifera L.	NC	gonnin	Cultivated	Palm	Water/milk/Fruit flesh	Beverage/ Fruit/ Oil
	Elaeis guineensis Jacq.	NC	edé / dé	Cultivated	Palm	Fruit pulp/ Stem sap / Kernel	Snack/Oil/ Alcoholic beverage/ Nuts and seeds
	Phoenix reclinata Jacq.	VP 166	ossé / séli	Semi-cultivated	Palm	Fruit pulp	Fruit
Asteraceae	*Bidens pilosa* L.	VP 100	djanhounkpi / adjaman	Wild	Herb	Young leaves	Leafy vegetables
	Crassocephalum rubens (Juss. ex Jacq.) S. Moore	VP 109	douhô / akogbo	Wild	Herb	Young leaves	Leafy vegetables
	Emilia praetermissa Milne-Redh.	VP 093	gbédji wonto / gbéwonto	Wild	Herb	Leaves	Leafy vegetables
	Gymnanthemum amygdalinum (Delile) Sch.Bip.	VP 399	aloman / gbéloman	Cultivated	Herb	Young leaves	Leafy vegetables
	Launaea taraxacifolia (Willd.) Amin ex C. Jeffrey	VP 365	lanto/awonto	Semi-cultivated	Herb	Leaves	Leafy vegetables
	Sclerocarpus africanus Jacq.	VP 568	tôhloué	Wild	Herb	Young leaves	Leafy vegetables
	Struchium sparganophorum (L.) Kuntze	VP 258	tôlo	Wild	Herb	(Young) leaves	Leafy vegetables
	Vernonia amygdalina Delile	VP 228	aloman	Cultivated	Shrub	Leaves	Leafy vegetables

Basellaceae	*Basella alba* L.	VP 042	agounman / yovogboman	Cultivated	Herb	Leaves	Leafy vegetables
Boraginaceae	*Heliotropium indicum* L.	VP 322	koklodin	Wild	Herb	Young leaves	Leafy vegetables
Bromeliaceae	*Ananas comosus* (L.) Merr.	VP 293	yèdjio / gondé	Cultivated	Herb	Fruit pulp	Fruit/ Beverage
Capparaceae	*Crateva adansonii* DC.	VP 527	sofan	Cultivated	Shrub	Leaves	Leafy vegetables
Caricaceae	*Carica papaya* L.	VP 022	gbakpia/akpè	Cultivated	Herb	Fruit pulp	Fruit
Cleomaceae	*Cleome gynandra* L.	VP 13	kaya / sambo	Semi-cultivated	Herb	Young leaves	Leafy vegetables
	Cleome rutidosperma DC.	VP 545	kaya assou	Wild	Herb	Leaves	Leafy vegetables
Combretaceae	*Terminalia leiocarpa* (DC.) Baill.	VP 078	dèman/kèkèman	Semi-cultivated	Tree	Young leaves	Leafy vegetables
	Terminalia catappa L.	VP 611	cola	Cultivated	Tree	Fruit pulp/ Young leaves	Fruit/ Leafy vegetables
	Terminalia schimperiana Hochst	VP 544	tiidou	Wild	Shrub	Leaves	Leafy vegetables
Convolvulaceae	*Ipomoea aquatica* Forssk.	VP 562	tôwèliman	Wild	Herb	Leaves	Leafy vegetables
	Ipomoea batatas (L.) Lam.	VP 199	oyoué/houèli wé	Cultivated	Herb	Tubers/ Young leaves	Staple (roots and tubers)/ Leafy vegetables
Cucurbitaceae	*Citrullus lanatus* (Thunb.) Matsum. & Nakai	NC	goussi	Cultivated	Herb	Seeds	Condiment
	Cucurbita pepo L.	VP 253	èkpè	Cultivated	Vine	Fruit pulp	Vegetables
	Telfairia occidentalis Hook.f.	VP 214	loko/lokoman	Cultivated	Vine	Young leaves	Leafy vegetables
Dioscoreaceae	*Dioscorea alata* L.	VP 256	dangbouékô/tévè	Cultivated	Vine	Tubers	Staple (roots and tubers)
	Dioscorea bulbifera L.	VP 130	kpindouévi-té/assô	Cultivated	Vine	Fruit/Tubers	Staple (roots and tubers)/ Staple (roots and tubers)

	Dioscorea cayennensis Lam.	VP 099	gbété/té-kanli	Cultivated	Vine	Tubers	Staple (roots and tubers)
	Dioscorea dumetorum (Kunth) Pax	VP 094	kpindouévi-té/lévé	Cultivated	Vine	Tubers	Staple (roots and tubers)
	Dioscorea togoensis R. Knuth	VP 29	gbété/tchantchansè	Cultivated	Vine	Tubers	Staple (roots and tubers)
Euphorbiaceae	*Acalypha ciliata* Forssk.	VP 259	zôfiôman	Wild	Herb	Young leaves	Leafy vegetables
	Cnidoscolus aconitifolius (Mill.) I.M. Johnst.	VP 557	ayanonkpadja/alôfiè	Cultivated	Shrub	Young leaves	Leafy vegetables
	Manihot esculenta Crantz	VP 577	kouté/ako	Cultivated	Shrub	Young leaves/ Tubers	Leafy vegetables/ Staple (roots and tubers)/ Alcoholic beverage (sodabi)/ Snack (donut)
Fabaceae / Caesalpinioideae	*Dialium guineense* Willd.	VP 614	tôtouè/tssissrè	Wild	Tree	Fruit pulp	Fruit
	Senna italica Mill.	VP 143	dougba/houéto	Wild	Herb	Young leaves	Leafy vegetables
	Senna occidentalis (L.) Link	VP 400	dougba	Wild	Herb	Young leaves	Leafy vegetables
	Senna sophera (L.) Roxb.	VP 518	dougba-kékété	Wild	Herb	Leaves	Leafy vegetables
	Tamarindus indica L.	NC	yovo tôtouè	Cultivated	Tree	Fruit pulp	Fruit
Fabaceae / Mimosoideae	*Parkia biglobosa* (Jacq.) R.Br. ex G.Don	VP 435	ahoua	Wild	Tree	Fruit pulp	Fruit/ Condiment (mustard)
Fabaceae / Papilionoideae	*Arachis hypogaea* L.	VP 300	aziin	Cultivated	Herb	Seeds	Nuts/ Condiment/Oil
	Cajanus cajan (L.) Huth	VP 288	blikoyoué/klouékoun	Cultivated	Shrub	Seeds	Legumes/ Snack (donut)
	Glycine max (L.) Merr.	NC	sodja	Cultivated	Herb	Seeds	Legumes
	Vicia lens (L.) Coss. & Germ.	NC	doyiwé	Cultivated	Herb	Seeds	Legumes

	Millettia thonningii (Schumach. & Thonn.) Baker	VP 127	gbègbè	Wild	Tree	Fruit pulp/ Young leaves	Fruit/ Leafy vegetables
	Ormocarpum sennoides (Willd.) DC.	VP 075	sisri-ninwi	Cultivated	Shrub	Leaves	Leafy vegetables
	Phaseolus lunatus L.	VP 033	kpakpoué/akpakoun	Cultivated	Herb	Seeds/ Young leaves	Legumes/ Leafy vegetables
	Pterocarpus santalinoides L'Her. ex DC.	VP 379	gbègbè	Cultivated	Tree	Fruit pulp	Fruit
	Sphenostylis stenocarpa (Hochst. ex A.Rich.) Harms	VP 276	soyi	Cultivated	Herb	Seeds	Legumes
	Vigna subterranea (L.) Verdc.	VP 280	azigokoui	Cultivated	Herb	Seeds	Legumes
	Vigna unguiculata (L.) Walp.	VP 279	ayi	Cultivated	Herb	Young leaves/Seeds	Leafy vegetables/Legumes/ Snack (donut)
Irvingiaceae	*Irvingia gabonensis* (Aubry-Lecomte ex O'Rorke) Baill.	VP 206	atô/assiô	Cultivated	Tree	Fruit pulp :Seed	Fruit/ Condiment
Lamiaceae	*Hoslundia opposita* Vahl	VP 44	gbanlidô	Wild	Shrub	Young leaves/ Fruit pulp	Leafy vegetables/ Fruit
	Ocimum basilicum L.	VP 37	goklodamian/hodjo	Wild	Herb	Leaves/ Young leaves	Leafy vegetables/ Condiment
	Ocimum gratissimum L.	VP 12	tchamaïdo/tchamandido	Semi-cultivated	Herb	Young leaves	Leafy vegetables
	Vitex doniana Sweet	VP 036	afon / ofon	Wild	Tree	Young leaves/ Fruit pulp	Leafy vegetables/ Fruit
Lauraceae	*Persea americana* Mill.	VP 058	avoca / voca	Cultivated	Tree	Fruit pulp	Fruit
Malvaceae	*Abelmoschus esculentus* (L.) Moench	VP 275	djininhoun/ninhoun	Cultivated	Herb	Young leaves/ Fruit	Leafy vegetables/ Vegetables
	Abelmoschus moschatus Medik.	VP 448	ninhoungôtô	Cultivated	Herb	Fruit	Vegetables
	Adansonia digitata L.	VP 535	didon/azizon	Wild	Tree	Fruit pulp/ Young leaves	Fruit/ Leafy vegetables

	Bombax brevicuspe Sprague	VP 181	kpahoundèhoui	Wild	Tree	Young leaves	Leafy vegetables
	Ceiba pentandra (L.) Gaertn.	VP 141	hountiman/honssoufonman	Cultivated	Tree	Young leaves	Leafy vegetables
	Cola millenii K. Schum.	VP 64	didonvè/gbanhounkpè	Wild	Tree	Fruit pulp	Fruit
	Corchorus fascicularis Lam.	VP 413	tôssouninwi	Wild	Shrub	Leaves	Leafy vegetables
	Corchorus olitorius L.	VP 139	ninklui/dèmin alôviaton	Semi-cultivated	Herb	Leaves	Leafy vegetables
	Corchorus tridens L.	VP 513	hlôlouè/tèvègogo	Wild	Herb	Young leaves	Leafy vegetables
	Grewia carpinifolia Juss.	VP 552	kôzrè	Wild	Shrub	Fruit pulp/ Young leaves	Fruit/ Leafy vegetables
	Hibiscus articulatus Hochst. ex A.Rich.	VP 408	gbédji ninwi	Wild	Herb	Leaves	Leafy vegetables
	Hibiscus rostellatus Guill. & Perr.	VP 373	blôlouè	Wild	Herb	Young leaves	Leafy vegetables
	Pachira glabra Pasq.	VP 395	yovozii	Cultivated	Shrub	Fruit pulp	Fruit
	Rhodognaphalon brevicuspe (Sprague) Roberty	VP 447	nonhouin	Cultivated	Herb	Young leaves	Leafy vegetables
	Sida acuta Burm.f.	VP 502	avôhia	Wild	Herb	Leaves	Leafy vegetables
	Sida linifolia Juss. ex Cav.	VP 444	gbédji ninwi	Wild	Herb	Leaves	Leafy vegetables
	Sterculia tragacantha Lindl.	VP 436	hongbèdè	Wild	Shrub	Young leaves	Leafy vegetables
	Theobroma cacao L.	NC	cacao	Cultivated	Shrub	Arils	Fruit
	Triplochiton scleroxylon K. Schum.	VP 140	tiguiman/atiguiman	Wild	Tree	Young leaves	Leafy vegetables
Moraceae	*Artocarpus altilis* (Parkinson) Fosberg	VP 260	kouté akpan/blèfoutou	Cultivated	Tree	Fruit pulp	Fruit
	Artocarpus heterophyllus Lam.	VP 402	aziitchan/yovozii	Cultivated	Tree	Fruit pulp	Fruit
	Ficus thonningii Blume	VP 038	honboman	Cultivated	Tree	Young leaves	Leafy vegetables
Moringaceae	*Moringa oleifera* Lam.	VP 350	kpadjiman/kpatrovi	Semi-cultivated	Shrub	Leaves	Leafy vegetables
Musaceae	*Musa* sp	NC	djangan	Cultivated	Herb	Fruit pulp	Fruit

	Musa spp	NC	danyotchio/avlanto	Cultivated	Herb	Unripe fruit	Fruit
Myrtaceae	*Psidium guajava* L.	VP 597	gogbabiè/gbabè	Wild	Shrub	Fruit pulp	Fruit
Passifloraceae	*Passiflora edulis* Sims	VP 126	loko ossou/lokoman	Cultivated	Vine	Young leaves	Leafy vegetables
	Passiflora foetida L.	VP 027	azigloé/gbatotoué	Wild	Herb	Fruit pulp/ Young leaves	Fruit/ Leafy vegetables
Pedaliaceae	*Sesamum radiatum* Thonn. ex Hornem.	VP 158	agbôman	Cultivated	Herb	Young leaves	Leafy vegetables
Poaceae	*Oriza spp*	NC	monlou	Cultivated	Herb	Seed	Staple (Cereals)
	Saccharum officinarum L.	VP 184	amouléké/léké	Cultivated	Herb	Stem	Snack
	Sorghum bicolor (L.) Moench	NC	*ahoo*	Cultivated	Herb	Seed	Staple (cereals)
	Zea mays L.	NC	yèvo/gbado	Cultivated	Herb	Seeds	Snack (Cereals)/ Staple (Cereals)/ Alcoholic beverage/ Snack (donut)
Polygalaceae	*Carpolobia lutea* G. Don	VP 542	avia/avian	Wild	Shrub	Fruit pulp	Fruit
Rubiaceae	*Chassalia kolly* (Schumach.) Hepper	VP 324	kpôkpôeman	Wild	Shrub	Young leaves	Leafy vegetables
	Macrosphyra longistyla (DC.) Hook ;f. ex Hiern	VP 284	ziguidigoué	Wild	Shrub	Young leaves/ Fruit pulp	Leafy vegetables/ Fruit
	Mussaenda elegans Schumach. & Thonn.	VP 137	dinhoui/alouiloui	Wild	Shrub	Fruit pulp	Fruit
	Rytigynia umbellulata (Hiern) Robyns	VP 285	honsôtin	Wild	Shrub	Young leaves	Leafy vegetables
Rutaceae	*Citrus aurantiifolia* (Christm.) Swingle	VP 297	loboklé/alomin-klé	Cultivated	Shrub	Fruit pulp/ Fruit juice	Fruit/ Beverage
	Citrus x aurantium L.	VP 065	vètchan	Cultivated	Shrub	Fruit pulp	Fruit
	Citrus maxima (Burm.) Merr.	VP 345	pamplemousse	Cultivated	Shrub	Fruit pulp	Fruit
	Citrus deliciosa Ten.	VP 613	liman/mandarine	Cultivated	Shrub	Fruit pulp	Fruit
	Citrus sinensis (L.) Osbeck	VP 594	loboué/alomè	Cultivated	Tree	Fruit pulp	Fruit
Salicaceae	*Flacourtia indica* (Burm.f.) Merr.	VP 415	vlèhoui	Wild	Shrub	Fruit pulp	Fruit

Sapindaceae	*Blighia sapida* K.D. Koenig	VP 377	atcha/alissè	Cultivated	Tree	Arils	Fruit
	Deinbollia pinnata (Poir.) Schumach. & Thonn.	VP 434	ahongoué/ lingbônoukoun	Wild	Shrub	Young leaves/ Fruit pulp	Leafy vegetables/ Fruit
	Paullinia pinnata L.	VP 603	ganganyissè	Wild	Herb	Fruit pulp	Fruit
Sapotaceae	*Chrysophyllum albidum* G. Don	VP 062	azongogoé/azonvè	Wild	Tree	Fruit pulp	Fruit
	Manilkara zapota (L.) P. Royen	VP 424	chapoti	Cultivated	Tree	Fruit pulp	Fruit
	Malacantha alnifolia (Baker) Pierre	VP 138	hongbèdè/hongbèdèman	Cultivated	Shrub	Young leaves	Leafy vegetables
	Synsepalum dulcificum (Schumach. & Thonn.) Daniell	VP 147	sislè /assièssiè	Wild	Shrub	Fruit pulp	Fruit
Solanaceae	*Capsicum annuum* L.	VP 091	ountakoui kékété/gbataki	Cultivated	Herb	Fruit	Condiment
	Solanum aethiopicum L.	VP 087	ehougbo/ogboo	Cultivated	Herb	Fruit/ Young leaves	Vegetables/ Leafy vegetables
	Solanum annuum C.V. Morton	VP 090	ountakoui gaga/vavo-gâ	Cultivated	Herb	Fruit	Vegetables
	Solanum lycopersicum L.	VP 319	djoudobgé/agbotouloui	Cultivated	Herb	Fruit	Vegetables
	Solanum macrocarpon L.	VP 271	gboman/gboman wé	Cultivated	Herb	Leaves	Leafy vegetables
	Solanum melongena L.	NC	gbissan gôtôdoui/kénongbissan	Cultivated	Herb	Fruit	Vegetables
	Solanum torvum Sw.	NC	èhougbo	Cultivated	Herb	Ripe fresh fruit	Vegetables
Talinaceae	*Talinum fruticosum* (L.) Juss.	VP 430	aglassiman/glassoué	Wild	Herb	Leaves	Leafy vegetables
Urticaceae	*Laportea aestuans* (L.) Chew	VP 508	hôlou gbolôvi / trinnonmansoudo	Wild	Herb	(Young) leaves	Leafy vegetables
Verbenaceae	*Stachytarpheta indica* (L.) Vahl	VP 553	kouèssivi/danvô	Wild	Herb	Leaves	Leafy vegetables
Violaceae	*Afrohybanthus enneaspermus* (L.) Flicker	VP 536	gbédji ninwi	Wild	Herb	Leaves	Leafy vegetables
Zingiberaceae	*Aframomum cereum* (Hook.f.) K. Schum.	VP 150	goudou	Wild	Herb	Fruit pulp	Fruit
	Alpinia vittata W. Bull	VP 555	ditia-vè	Cultivated	Herb	Rhizome	Condiment
	Zingiber officinale Roscoe	VP 554	ditia-wé	Cultivated	Herb	Rhizome	Condiment

NC :not collected species due to their unavailability during specimen collection

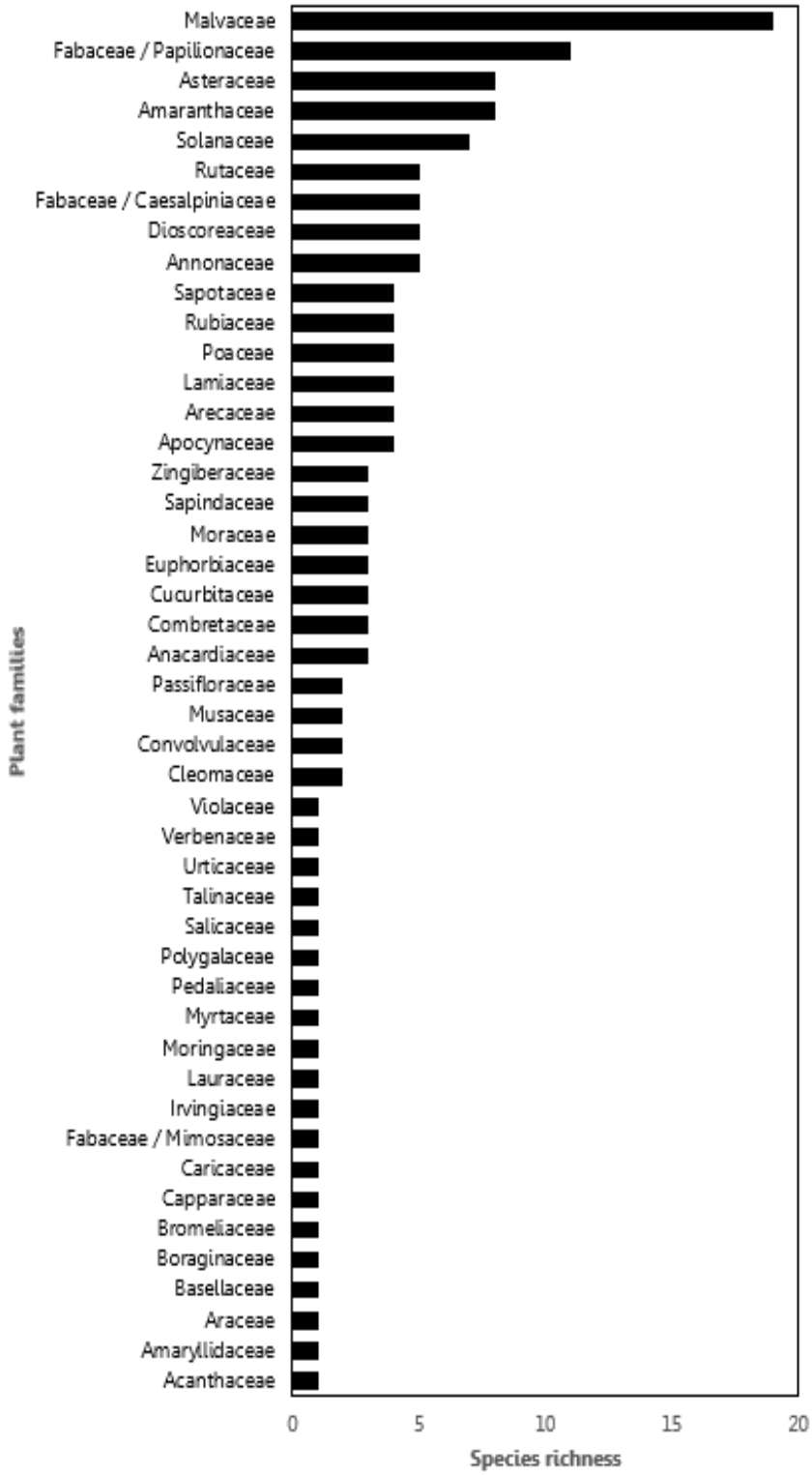

Figure 2. Number of edible species used as foods for 46 plant families in the study area

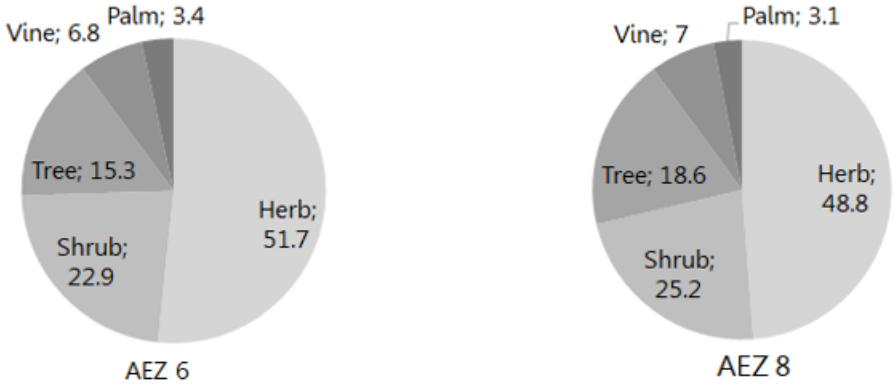

Figure 3. Distribution (%) of edible plant species according to their habits and stratified by agroecological zone

Plant parts used and specific food uses

In AEZ 6, the 118 EPS have 95 different plant parts that are used for 130 different specific food uses. Results show that EPS were mostly used for their leaves (47%), followed by fruits (14%), seeds (9%), and roots/tubers/ rhizomes (8%). Some EPS have several plant parts used for food. For specific food uses, EPS are mostly used as leafy vegetables (44%), followed by their use as fruit (32%), and staple (9%). The 124 EPS inventoried in the AEZ 8 have 98 different plant parts that are used for 131 specific food uses. Leaves (47%), fruits (15%), and roots/tubers/ rhizomes (9%) are the most plant parts used (Tables 3-4).

Table 3. Species diversity index

Index	AEZ 6	AEZ 8	All zone
Species Richness (SR)	118	124	146

AEZ= Agroecological Zone

Table 4. Edible plant parts used in the two agroecological zones

Plant parts used	Number of species	
	AEZ 6	AEZ 8
Leaves	55	58
Fruits (arils, flesh, pulp)	17	18
Seeds	11	9
Roots/Tubers/Rhizomes	10	11
Stem & stem sap	1	1
Water/ Milk	1	1
Total	**95**	**98**

AEZ= Agroecological Zone

The most specific food uses are leafy vegetables (41%), followed by fruits (39%). Irrespective of AEZs, the 146 edible plant species have 173 different plant parts that are used for 184 different specific uses. (Table-5).

Discussion

Diversity of edible plants and their status as compared with reports from other African countries

The survey revealed an impressive diversity of edible plant species in the study area with 146 edible plant species belonging to 46 botanical families. The diversity of edible plant species found in the present study appeared higher than that observed in the same area (Department) by Hadonou-Yovo *et al.* (2019). Indeed, they inventoried 35 edible plant species in the study on diversity and use pattern of woody plant species of Mono Biosphere. However, several studies found a higher diversity of edible plant species compared to this study. Indeed, Dansi *et al.* (2008), Achigan-Dako *et al.* (2010) and Codjia *et al.* (2003) inventoried respectively 187 leafy vegetables in three agroecological zones covered 73 villages; 245 plant species that were used by communities throughout Benin and

162 plant species that were consumed by the local population in Benin. A study conducted in arid and semi-arid areas in Benin by Segnon and Achigan-Dako (2014) recorded 115 edible plant species, showing lower plant species diversity than in this study. Compared to studies from other African countries, we observed that edible plant diversity recorded in the present study is higher than those from the south of Mali, where 87 food plants were recorded (Diarra *et al.* 2016). Likewise, in the Ilkisonko Maasai community of Kenya, Kimondo *et al.* (2015) observed that 30 plant species were used as food and medicine. In Tanzania, Keding *et al.* (2007) recorded 74 vegetables in one single district (Muheza). Also, in Togo, one bordered country of Benin, 86 edible plant species were recorded in the maritime region (Effoe *et al.* 2020). These different trends observed could essentially be related to the scope, geography, ecology, ethnicity as well as the methodological approach used in the studies.

Table 5. Specific food uses of EPS known by the two AEZs's population

Specific uses	**Number of species**	
	AEZ 6	**AEZ 8**
Leafy vegetable	52	51
Fruit	38	42
Staple	11	9
Snack (other than fruit/nut)	2	2
Other vegetables	6	6
Condiment	4	4
Legumes	5	5
Nuts and seed	3	3
Oil	3	3
Beverage	3	3
Alcoholic beverage	3	3
Total	**130**	**131**

AEZ= Agroecological Zone

This study also showed a difference in the level of species diversity between the two agroecological zones (AEZs). For example, AEZ 8 has higher edible plant diversity compared with AEZ 6. This could be due to the more favorable environmental conditions in AEZ 8 with several streams and lowlands, leading to more diverse vegetation than AEZ 6, in which natural vegetation has given way to a fallow palm vineyard. A similar trend was observed by Chadare *et al.* (2018) who found that AEZ 8 with a rainfall of 1200 mm had the highest food species diversity compared to other AEZs in Benin.

Our findings revealed that the diversity of cultivated food plants was relatively higher compared to wild food plants. This seems reasonable since crop production was the main activity in the study area leading to easier physical access to cultivated species than wild. Conversely, Achigan-Dako *et al.* (2010) and Dansi *et al.* (2008) already described similar trends where they found a higher diversity of wild food plants compared with cultivated food plants. Indeed, of the 245 vegetables recorded by Achigan-Dako *et al.* (2010), 176 were wilds, only 47 were under cultivation and 22 of these resources were reported both as cultivated and wild. Dansi *et al.* (2008) recorded 47 cultivated leafy vegetables versus 140 wilds. Another study on food biodiversity including both locally cultivated and wild food species in Guasaganda, Central Ecuador reported lower diversity of wild (49 species) and cultivated (41 species) food plants (Penafiel *et al.* 2019). The differences with our findings could be explained by many factors including the study scope, cultural background and the level of survey participants' knowledge of food plants.

The important share of wild and semi-wild species (45%) in the edible plants recorded in our study indicates that people are still relying on nature for food. Despite this relatively high diversity of wild and semi-wild food plants, studies have revealed their low contributions to the food intake of children and women (Boedecker *et al.* 2014, Powell *et al.* 2013). This indicates that the species may not be used frequently in food preparation for these categories. An explanation for this is that wild food plants, especially fruit-gathering are generally interpreted as being indicative of famine and their consumption connotes indignity and social stigma (Fentahun & Hager 2009). Also, Pawera *et al.* (2020) highlighted that the barriers to consuming wild foods were the low availability, time constraints, cultural acceptability and limited knowledge of their nutritional value. Powell *et al.* (2015) in their study conducted in rural South Africa concluded that not all known wild food species were consumed and the little that was consumed was in small quantities, despite their nutritional importance. Furthermore, N'Danikou *et al.* (2017)

in their investigations in Mali found that the rural households which had access to higher diversity of wild food plants were less vulnerable to food insecurity compared to the others.

Diversity of botanical families and plant habits, and their relationship with food uses

Results showed that Malvaceae was the most diverse botanical family providing food species in the study area (Fig. 2). This could be due to their easy growth in tropical regions, where environmental conditions are favourable. Also, it could be due to their wider distribution and abundance in the flora as well as the presence of bioactive ingredients as explained by Lulekal *et al.* (2013), and by the ecological appearance theory (Gaoue *et al.* 2017). The high diversity of Malvaceae species could also be attributed to the cultural history of communities since ethnic groups were seen to be specific to food patterns (Hassan *et al.* 2021a), meaning that edible plant species belonging to Malvaceae were more the 'food identity' than other botanical families in studied communities. In contrast with the current finding, Rosaceae (Singh *et al.* 2021, Wali *et al.* 2021), Asteraceae (Dansi *et al.* 2008, Weldearegay & Awas 2021), Fabaceae (Boakye *et al.* 2022, de Oliveira *et al.* 2021) were reported as the dominant botanical families in other areas of Africa.

This study highlighted that herbaceous plants were the most dominant plant habit used in the study area. This could be supported by the availability hypothesis whereby herbaceous plants are of short growing cycles and their resources are renewed at a higher frequency compared to shrubs, trees and others (Albuquerque 2006). Indeed, the localities involved in this study were rural communities with relatively easy access to natural resources, including wild and cultivated food resources where herbaceous plants were dominant.

The level of knowledge of the population on the food use of plants is lower in the commune of Houéyogbé (AEZ 6) compared to Bopa (AEZ 8) in terms of the diversity of botanical families, species richness, plant parts use and specific food uses. This could be explained by the higher level of urbanization in Houéyogbé compared with Bopa. Indeed, the increase in the level of urbanization in communities participates in the alteration of plant diversity as pointed out by Hussain *et al.* (2022) in a quantitative ethnomedicinal study of indigenous knowledge on medicinal plants used by the tribal communities of Central Kurram, Khyber Pakhtunkhwa, Pakistan, and consequently contributed to the relative loss of their knowledge. Other authors discussed the linkages between urbanization and knowledge loss and have reported a negative impact of urbanization on the preservation of local ecological knowledge (Brandt *et al.* 2013; Gandolfo & Hanazaki 2014, Reyes-García *et al.* 2013, Sogbohossou *et al.* 2015).

Importance of leaves and leafy vegetables

In the present study, leaves appeared to be the most used plant part. Similarly, Wali *et al.* (2021), in a study conducted in local people of Shishi Koh valley, Chitral, Pakistan, found that leaves were the most used plant part. Also, Weldearegay and Awas (2021) in the study conducted in and around Sirso Natural Forest of Melokoza District, Gamo Goffa Zone, Southern Ethiopia, found that fresh leaves were the most frequently reported plant parts.

The dominance of leaves among other plant parts used by communities in rural Benin could be explained by their easy collection (Haq *et al.* 2020, Wali *et al.* 2021); availability of large quantities and ease of preparation (Jan *et al.* 2020, Weldearegay & Awas 2021). Also, in comparison with the harvesting of other plant parts such as roots, bulbs, stems, and whole plant harvesting, the use of leaves has minimal effect on the long-term survival of the plants, and this reduces the threats on the harvested plants and therefore makes plants safe and sustainable from the conservation point of view (Weldearegay & Awas 2021). One major explanation for the use of leaves more than other parts of the plant might be, in addition to being a source of micronutrients, leaves also contain various secondary metabolites (Ahmad *et al.* 2014, Haq *et al.* 2020) and other bioactive components that allow them to play an important medicinal role (Hassan *et al.* 2021b, Yousuf *et al.* 2020).

The present study revealed that the plant species listed have multiple specific food uses. Indeed, the 146 edible plant species have 186 different specific uses. Termote *et al.* (2011) recorded 85 wild plant species with 96 plant parts that can be employed raw or prepared for 106 different specific food uses, while Ju *et al.* (2013) recorded 168 wild plant species with 191 specific food uses. More specifically, leafy vegetable uses were the most important followed by fruit uses. This can be explained and is only the consequence of the primacy of the leaves' uses over other plant parts since this study dealt only with food plants. A similar trend was found by Ngbolua *et al.* (2021) who observed that leafy vegetables followed by fruits were the most common uses of targeted wild edible plant species. Additionally, Sachula *et al.* (2020) in Inner Mongolian, China, and Cao *et al.* (2020) in Jiangcheng County, Pu'er, Southwest China, found that vegetables including leaves were the most specific use of wild edible plants collected by the locals. Conversely, other studies showed instead that fruits use was the most specific food use

among non-cultivated edible plants in Tshopo District, DR Congo (Termote *et al.* 2011) and are the most common commercialized in the Ho Central Market of Ghana indicating their dominance in the localities around the Ho Central market (Boakye *et al.* 2022).

Limitations of the study

One of the strengths of this study is the documentation of the specific food uses of inventoried edible plant species. However, as important as making an inventory of plants is knowing their culinary uses. The strategies such as washing, soaking, dehulling, milling, heating, roasting, boiling, infusing, germinating, fermenting, curing, preserving, and dehydrating, or the combinations of some of these processes can act on the bioavailability of nutrients and the inactivation or reduction of antinutritional factors (Akeem *et al.* 2019). Therefore, it is relevant that ethnobotanical studies collect information on the culinary uses of food species. Another weakness lies in the methodological approach. Indeed, to confirm the high species diversity observed in the study area, it would be appropriate to use individual interviews that would help calculate specific diversity indices, such as the Shannon-Weaver diversity index, Simpson diversity index, or Pielou's index of Equitability, to better appreciate the level of food species diversity in the study site. Lastly, the use of the mixed focus group (men and women) could be a limitation of this study. We could have carried out focus groups with men or women separately to be able not only to compare data among sex but also to avoid the bias that would be induced by the presence of men on women. This may have prevented women from expressing themselves in complete peace of mind.

Conclusion

This study showed the great potential of local food plants and related indigenous knowledge in both agroecological zones of southern Benin. Moreover, species diversity was higher in AEZ 8 than in AEZ 6. Different plant parts are used by local people, and the most frequently used parts were leafy vegetables, fruits, and seeds. These plants have different specific food uses, with leafy vegetable uses being the most frequent, followed by fruit uses. The nutritional potential of plant species in the study area could contribute to the improvement of food security and nutrition of the population. Findings suggest that locally available food plants especially leafy vegetables and fruits should be valued to combat micronutrient deficiencies among rural vulnerable populations in general, children and women in particular. The study presents the starting point of the valorization of local agrobiodiversity through their inventory and their various specific food uses. Further research should consider phytochemical analysis to identify plant species not only with interesting nutritional potential but also with acceptable levels of bioactive compounds like phenols, phytates, etc. This could be a better way to value local food plants in the formulation of complementary foods for infants and young children. Since the study populations rely also on wild species, domestication of these species would be necessary for their conservation and sustainable use.

Declarations

List of abbreviations: AEZs: Agroecological Zone; **CENAP:** Centre National d'Agro-Pédologie; **EPS:** Edible Plant Species; **FAO:** Food and Agriculture Organization; **FGDs:** Focus Group Discussions; **ICF:** Inner City Fund; **IFAD:** International Fund For Agricultural Development; **INSAE:** Institut National de la Statistique et de l'Analyse Economique; **LMICs:** Low- and Middle- Income Countries; **PAM:** Programme Alimentaire Mondial; **PAR:** Platform for Agrobiodiversity Research; **WFP:** World Food Program; **UNICEF:** United Nations International Children's Emergency Fund; **WHO:** World Health Organization

Ethics approval and consent to participate: This study received ethical clearance from the National Ethics Committee for Scientific Research (N°45/MS/DC/SGM/DFR/CNERS/SA). All participants in this study signed the informed consent after an explanation of the objectives, confidentiality, and duration of the study.

Consent for publication: Not Applicable.

Availability of data and materials: The Dataset has not been deposited in public repositories but is available upon request from the corresponding author.

Competing interests: The authors declare no conflict of interests.

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Authors' contributions: EK: Data collection, data management, and analysis, manuscript writing and correction. **WAH**: Study design, data management, analysis supervision, reading, and correction of the manuscript. **NS**: Study design, data collection supervision, specimen identification, reading, and correction of the manuscript. **CVPS:** Data collection, data management, manuscript reading. **GN-B**: Study design, data collection supervision, data management, and analysis supervision, reading, and improvement of the manuscript. **CT**: Study design, specimen identification, data management, and analysis supervision, reading, and improvement of the manuscript.

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